Matrix E1 Series (1G58x-09 and 1H582-xx) Configuration Guide

Firmware Version 3.07.xx

P/N 9033755-22

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About This Guide

Welcome to the Enterasys Networks ***Matrix E1 (1G58x-09 and 1H582-xx) Configuration Guide***. This manual explains how to access the devices' Command Line Interface (CLI) and how to use it to configure the Matrix E1 1G58x-09 and 1H582-xx switch/router devices.

Important Notice

Depending on the firmware version used in the Matrix E1 device, some features described in this document may not be supported. Refer to the Release Notes shipped with the Matrix E1 device to determine which features are supported.

USING THIS GUIDE

A general working knowledge of basic network operations and an understanding of CLI management applications is helpful before configuring the Matrix E1 device.

This manual describes how to do the following:

- Access the Matrix E1 CLI
- Use CLI commands to perform network management and device configuration operations
- Establish and manage Virtual Local Area Networks (VLANs)
- Establish and manage priority classification
- Configuring Convergence End Points (CEP) IP telephony detection
- Configure IP routing and routing protocols, including RIP versions 1 and 2, OSPF, DVMRP and VRRP
- Establish and manage security, including 802.1x authentication, MAC authentication, MAC locking, port web authentication, ACLs, DoS prevention and Flow Setup Throttling (FST).

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STRUCTURE OF THIS GUIDE

The guide is organized as follows:

Chapter 1, **Introduction**, provides an overview of the tasks that can be accomplished using the CLI interface, an overview of local management requirements, and information about obtaining technical support.

Chapter 2, **Management Terminal and Modem Setup Requirements**, describes how to configure and connect a management terminal or a modem to the Matrix E1 device.

Chapter 3, **Startup and General Configuration**, provides an overview of the device's factory default settings and describes how to start the CLI interface, how to set basic system information, how to download a firmware image, how to configure Telnet, how to manage configuration files, how to set the login password, how to configure Enterasys and Cisco discovery protocols, how to exit the CLI, how to reset the device, and how to prepare the device for router mode operation.

Chapter 4, **Port Configuration**, describes how to review port status, enable or disable ports, set port speed and duplex mode, enable or disable port auto-negotiation, set port flow control and thresholds, set port traps and port mirroring, and how to configure port trunking and port broadcast suppression.

Chapter 5, **SNMP Configuration**, describes how to disable or enable the Simple Network Management Protocol, how to review SNMP statistics, and how to configure SNMP users, and how to associate access rights, security and parameters for those users to receive SNMP notification messages. A sample basic SNPM trap configuration is also provided.

Chapter 6, **Spanning Tree Configuration**, describes how to review and set Spanning Tree (802.1D, 802.1w and 802.1s) bridge parameters for the device, including bridge priority, hello time, maximum aging time and forward delay; and how to review and set Spanning Tree port parameters, including port priority and path costs.

Chapter 7, **802.1Q VLAN Configuration**, describes how to create static VLANs, select the mode of operation for each port, filter frames according to VLAN, establish VLAN forwarding (egress) lists, route frames according to VLAN ID, display the current ports and port types associated with a VLAN and protocol, create a secure management VLAN, and configure ports on the device as GVRP-aware ports. VLAN classification and classification rules are also discussed.

Chapter 8, **Policy Classification Configuration**, describes how to create, change or remove user roles or profiles based on business-specific use of network services; how to permit or deny access to specific services by creating and assigning classification rules which map user profiles to frame filtering policies; and how to assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.

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Chapter 9, **Port Priority and Classification Configuration**, describes how to set the transmit priority of each port, display the current traffic class mapping-to-priority of each port, set ports to either transmit frames according to selected priority transmit queues or percentage of port transmission capacity for each queue, assign transmit priorities according to protocol types, and configure a rate limit for a given port and list of priorities.

Chapter 10, **IGMP Configuration**, describes how to configure Internet Group Management Protocol (IGMP) settings, including IGMP query intervals, IGMP and IGMP group status.

Chapter 11, **Logging and Switch Network Management**, describes how to manage general switch settings, how to monitor network events and status while the device is in switch mode, including the eventlog, command history, netstats and RMON statistics, how to configure system logging, how to manage network addresses, how to configure SNTP, how to configure node aliases, and how to configure Convergence End Points (CEP) IP telephony detection.

Chapter 12, **IP Configuration**, describes how to configure IP interface settings, how to review and save the routing configuration, how to review and configure the routing ARP table, how to review and configure routing broadcasts, and how to configure IP routes.

Chapter 13, **Routing Protocol Configuration**, describes how to configure RIP, OSPF, IRDP, DVMRP and VRRP.

Chapter 14, **Security Configuration**, describes how to configure security authentication, including RADIUS, 802.1X, MAC authentication, MAC locking, SSH, Denial of Service (DoS) prevention, Flow Setup Throttling (FST), IP access lists and port web authentication.

RELATED DOCUMENTS

The following Enterasys Networks documents may help you to set up, control, and manage the Matrix E1 device:

- *Ethernet Technology Guide*
- *Cabling Guide*
- *Matrix E1 (1G58x-09 or 1H582-xx) Installation Guide*
- *Matrix E1 (1G582-09 and 1H582-51) WebView User's Guide*

Documents listed above, can be obtained from the World Wide Web in Adobe Acrobat Portable Document Format (PDF) at the following web site:

http://www.enterasys.com/support/manuals/

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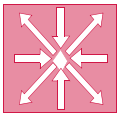
DOCUMENT CONVENTIONS

This guide uses the following conventions:



ROUTER: Calls the reader's attention to router-specific commands and information.

NOTE: Calls the reader's attention to any item of information that may be of special importance.

CAUTION: Contains information essential to avoiding damage to the equipment and/or network connectivity problems.

TYPOGRAPHICAL AND KEYSTROKE CONVENTIONS

bold type	Bold type indicates required user input, including command keywords, that must be entered as shown for the command to execute.
RETURN	Indicates either the ENTER or RETURN key, depending on your keyboard.
ESC	Indicates the keyboard Escape key.
SPACE bar	Indicates the keyboard space bar key.
BACKSPACE	Indicates the keyboard backspace key.
arrow keys	Refers to the four keyboard arrow keys.
[-]	Indicates the keyboard dash key.
DEL	Indicates the keyboard delete key.
italic type	When used in general text, italic type indicates complete document titles. When used in CLI command syntax, italic type indicates a user-supplied parameter, either required or optional, to be entered after the command keyword(s).

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n.nn	A period in numerals signals the decimal point indicator (e.g., 1.75 equals one and three fourths). Or, periods used in numerals signal the decimal point in Dotted Decimal Notation (DDN) (e.g., 000.000.000.000 in an IP address).
x	A lowercase italic *x* indicates the generic use of a letter (e.g., *xxx* indicates any combination of three alphabetic characters).
n	A lowercase italic *n* indicates the generic use of a number (e.g., 19*nn*) indicates a four-digit number in which the last two digits are unknown).
[ ]	Square brackets indicate optional parameters.
{ }	Braces indicate required parameters. One or more parameters must be entered.
|	A vertical bar indicates a choice in parameters.
[{ | }]	Braces and vertical bars within square brackets indicate a required choice within an optional element. You do not need to select one. If you do, you have some required choices.

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1

Introduction

This chapter provides an overview of the tasks that may be accomplished using the Matrix E1 1G58x-09 and 1H582-xx CLI interface, an introduction to in-band and out-of-band network management, and information on how to contact Enterasys Networks for technical support.

Important Notice

Depending on the firmware version used in the Matrix E1 1G58x-09 or 1H582-xx device, some features described in this document may not be supported. Refer to the Release Notes shipped with the Matrix E1 device to determine which features are supported.

1.1 OVERVIEW

Enterasys Networks' Matrix E1 CLI interface allows you to perform a variety of network management tasks, including the following:

- Assign IP address and subnet mask.
- Select a default gateway.
- Assign a login password to the device for additional security.
- Download a new firmware image.
- Designate which network management workstations receive SNMP traps from the device.
- View device, interface, and RMON statistics.
- Manage configuration files.
- Assign ports to operate in the standard or full duplex mode.
- Configure ports to perform load sharing using trunking and link aggregation commands.
- Control the number of received broadcasts that are switched to the other interfaces.
- Set flow control on a port-by-port basis.
- Configure ports to prioritize incoming frames at Layer 2, Layer 3, and Layer 4.

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- Clear NVRAM.
- Set 802.1Q VLAN memberships and port configurations.
- Redirect frames according to port or VLAN and transmit them on a preselected destination port.
- Configure the device to operate as a Generic Attribute Registration Protocol (GARP) device to dynamically create VLANs across a switched network.
- Configure the device to dynamically switch frames according to a characteristic rule and VLAN.
- Configure Spanning Trees.
- Configure Convergence End Points (CEP) IP telephony detection
- Configure interfaces for IP routing.
- Configure RIP, OSPF, IRDP, DVMRP and VRRP routing protocols.
- Configure security, including 802.1x authentication, MAC authentication, MAC locking, port web authentication, ACLs, DoS prevention a Flow Setup Throttling (FST).

ROUTER: This symbol denotes **router-only** functions. Features, commands and information in this guide not differentiated by this symbol refer to switch-mode operation.

There are five ways to manage the Matrix E1 device:

- Locally using a VT type terminal connected to the console port.
- Remotely using a VT type terminal connected through a modem.
- Remotely using an SNMP management station.
- In-band through a Telnet connection.
- Remotely using WebView, Enterasys Networks' embedded web server, for basic switch management tasks. WebView is currently not supported in router mode.

NOTE: This guide describes configuring and managing the Matrix E1 device using CLI commands. For details on using WebView for switch configuration and management tasks, refer to the *Matrix E1 (1G582-09 and 1H582-51) WebView User's Guide.*

Chapter 2 provides setup instructions for connecting a terminal or modem to the Matrix E1 device.

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1.2 GETTING HELP

For additional support related to this device or document, contact Enterasys Networks using one of the following methods:

World Wide Web	www.enterasys.com/support/
Phone	1-800-872-8440 (toll-free in U.S. and Canada) or 1-978-684-1000 For the Enterasys Networks Support toll-free number in your country: http://www.enterasys.com/services/support/contact
Internet mail	support@enterasys.com To expedite your message, type **[E-SERIES]** in the subject line.

To send comments or suggestions concerning this document to the Technical Publications Department:

techpubs@enterasys.com

Make sure to include the document Part Number in the email message.

Before calling Enterasys Networks, have the following information ready:

- Your Enterasys Networks service contract number
- A description of the failure
- A description of any action(s) already taken to resolve the problem (e.g., changing mode switches, rebooting the unit, etc.)
- The serial and revision numbers of all involved Enterasys Networks products in the network
- A description of your network environment (layout, cable type, etc.)
- Network load and frame size at the time of trouble (if known)
- The device history (i.e., have you returned the device before, is this a recurring problem, etc.)
- Any previous Return Material Authorization (RMA) numbers

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2

Management Terminal and Modem Setup Requirements

This chapter provides information about connecting a terminal or modem to the device's console port.

NOTE: Illustrations and most of the examples in this guide are based on the Matrix E1 1H582-51. Configuration and CLI output for the Matrix E1 1H582-25, and the 1G58x-09, may be different. Unless noted, procedures and performance features are similar for both models.

2.1 CONNECTING TO A CONSOLE PORT FOR LOCAL MANAGEMENT

To access local management on the Matrix E1 device, connect one of the following systems to the console port:

- IBM or compatible PC running a VT series emulation software package (Section 2.1.2).
- Digital Equipment Corporation VT series terminal; or VT type terminal running emulation programs for the Digital Equipment Corporation VT series (Section 2.1.3).
- A modem (Section 2.1.4).

2.1.1 What Is Needed

One RJ45-to-DB9 female adapter (supplied with the device).

The following is a list of the user-supplied parts that may be needed depending on the connection:

- UTP cable with RJ45 connectors
- RJ45-to-DB25 female adapter (PN 9372110)
- RJ45-to-DB25 male adapter (PN 9372112)

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Using a UTP cable with RJ45 connectors and RJ45-to-DB9 adapter, you can connect products equipped with an RJ45 console port to an IBM or compatible PC running a VT series emulation software package.

Using a UTP cable and an optional RJ45-to-DB25 female adapter (PN 9372110), you can connect products equipped with an RJ45 console port to a VT series terminal or VT type terminals running emulation programs for the VT series.

Using a UTP cable and an optional RJ45-to-DB25 male adapter (PN 9372112), you can connect products equipped with an RJ45 console port to a Hayes compatible modem that supports 9600 baud.

2.1.2 Connecting to an IBM or Compatible Device

To connect an IBM PC, or compatible device, running the VT terminal emulation, to an Enterasys Networks device console port (Figure 2-1), proceed as follows:

1. Connect the RJ45 connector at one end of the cable (not supplied) to the console port on the Enterasys Networks device.
2. Plug the RJ45 connector at the other end of the cable into the RJ45-to-DB9 adapter (supplied with the device). Refer to Section 2.1.5 for adapter wiring and signal assignments.
3. Connect the RJ45-to-DB9 adapter to the communications port on the PC.
4. Turn on the PC and configure your VT emulation package with the following parameters:

Parameter	Setting
Mode	7 Bit Control
Transmit	Transmit=9600
Bits Parity	8 Bits, No Parity
Stop Bit	1 Stop Bit

5. When these parameters are set, the Matrix E1 startup screen will display.

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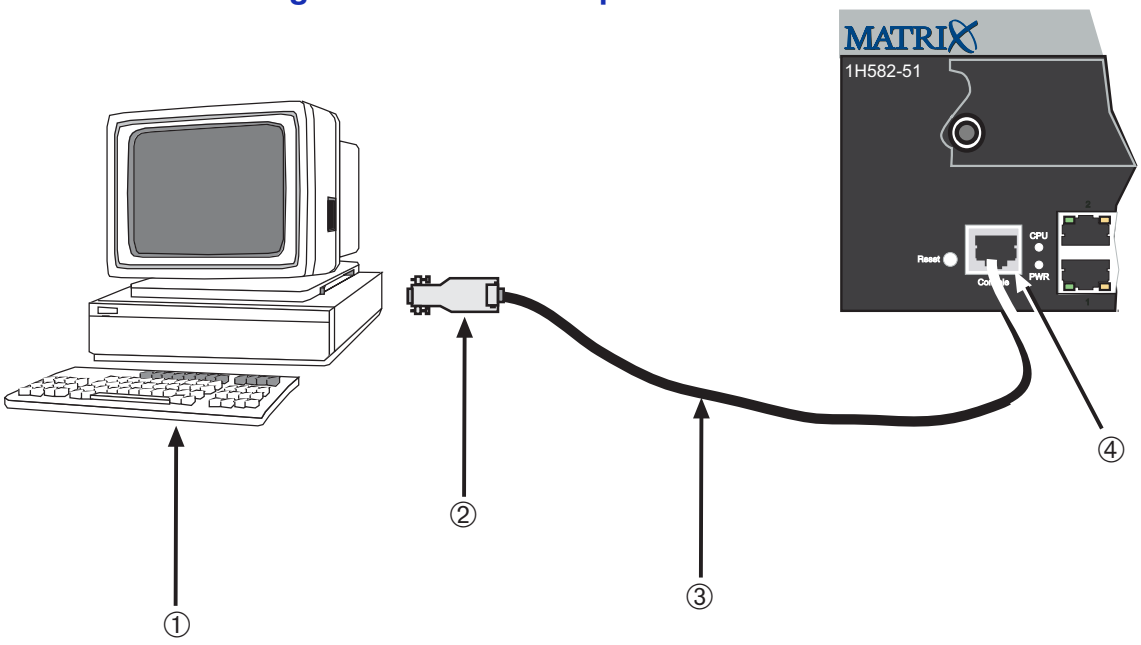
Figure 2-1 Connecting an IBM PC or Compatible Device



1	PC	**3**	UTP Cable with RJ45 Connectors
2	RJ45-to-DB9 PC Adapter	**4**	RJ45 Console Port

2.1.3 Connecting to a VT Series Terminal

To connect a VT series terminal to an Enterasys Networks switch console port (Figure 2-2), use a UTP cable with RJ45 connectors and an **optional** RJ45-to-DB25 female adapter (PN 9372110), and proceed as follows:

1. Connect the RJ45 connector at one end of the cable to the console port on the Enterasys Networks device.
2. Plug the RJ45 connector at the other end of the cable into the RJ45-to-DB25 female adapter. Refer to Section 2.1.5 for adapter wiring and signal assignments.
3. Connect the RJ45-to-DB25 adapter to the port labeled COMM on the VT terminal.
4. Turn on the terminal and access the setup directory. Set the following parameters on your terminal:

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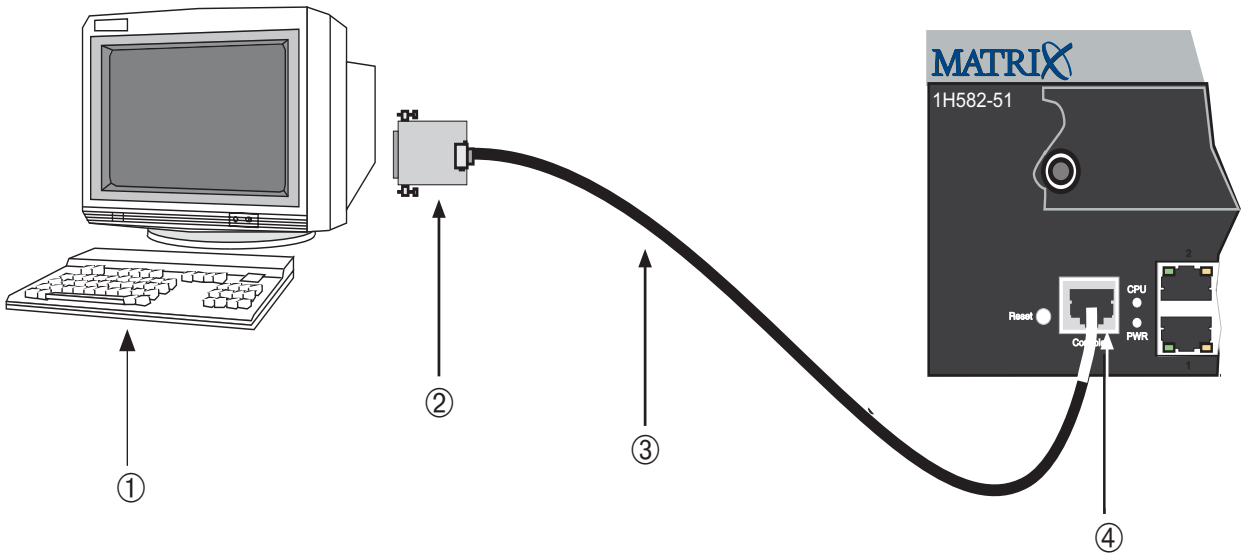
Parameter	Setting
Mode	7 Bit Control
Transmit	Transmit=9600
Bits Parity	8 Bits, No Parity
Stop Bit	1 Stop Bit

5. When these parameters are set, the Matrix E1 startup screen will display.

Figure 2-2 Connecting a VT Series Terminal



1 VT Series Terminal
2 RJ45-to-DB25 VT Adapter
3 UTP Cable with RJ45 Connectors
4 RJ45 Console Port

2.1.4 Connecting to a Modem

To connect a modem to an Enterasys Networks device modem port (Figure 2-3), use a UTP cable with RJ45 connectors and an **optional** RJ45-to-DB25 male adapter (PN 9372112), and proceed as follows:

1. Connect the RJ45 connector at one end of the cable to the modem port on the Enterasys Networks device.

2. Plug the RJ45 connector at the other end of the cable into the RJ45-to-DB25 male adapter. Refer to Section 2.1.5 for adapter wiring and signal assignments.

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3. Connect the RJ45-to-DB25 adapter to the communications port on the modem.
4. Turn on the modem and configure your VT emulation package with the following parameters:

Parameter	Setting
Mode	7 Bit Control
Transmit	Transmit=9600
Bits Parity	8 Bits, No Parity
Stop Bit	1 Stop Bit

5. When these parameters are set, the Matrix E1 startup screen will display.

2.1.4.1 Configuring the Modem to Not Send Login Requests

If the modem attempts to auto-connect or sends requests to the console port, the console port will treat these actions as login requests, and will fail the login and lockout the console session as a result.The modem should be configured to not send requests to the console port when attached. Suggested settings are below. Often, there is a set of dip-switches on the bottom of the modem that can be adjusted, as in the following example:

Switch	Setting	Action
1	on	DTR always on
2	off	Verbal result codes
3	off	Suppress result codes
4	off	Echo offline commands
5	off	Auto answer ring
6	on	Carrier detect override
7	off	Display all result codes
8	off	Disable AT command set
9	off	Disconnect with +++
10	on	Load $FO settings

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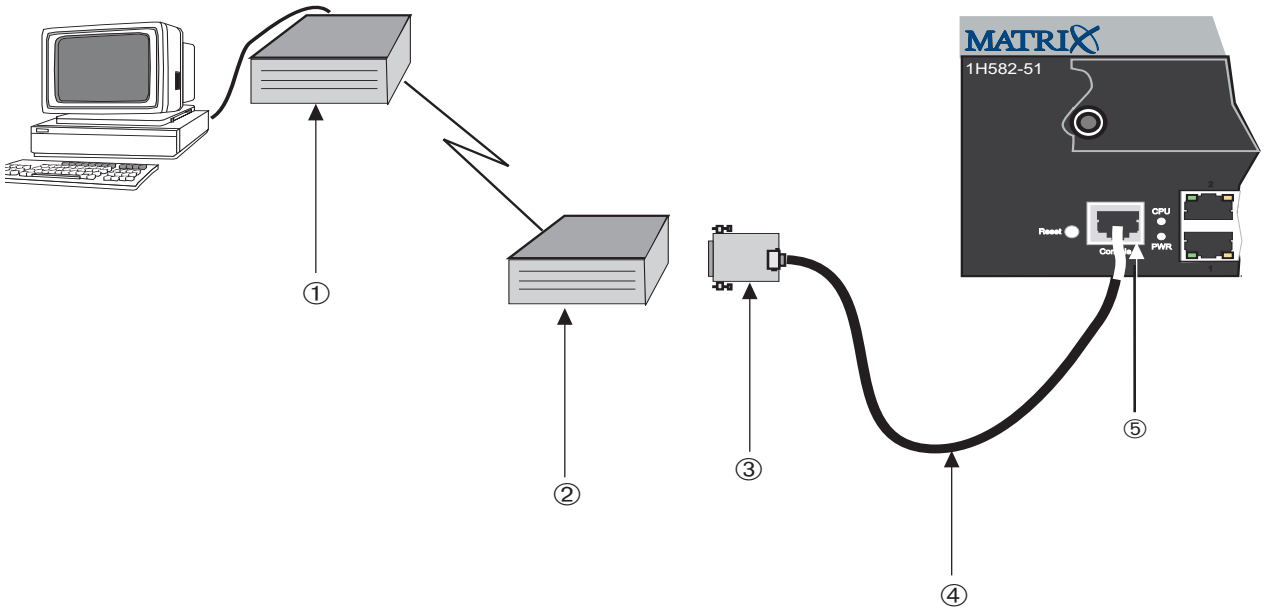
Another solution, if the modem cannot be configured to completely suppress traffic to the console port at start-up, would be to configure the E1 lockout retry count to a higher value or disable it altogether. You would do this using the **set system lockout attempts** command as described in Section 3.2.1.8.

Figure 2-3 Connecting to a Modem



1	RJ45 Modem Port	**3**	RJ45-to-DB25 Modem Adapter	**5**	RJ45 Console Port
2	Modem	**4**	UTP Cable with RJ45 Connectors		

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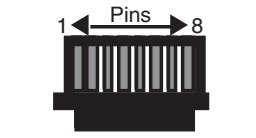
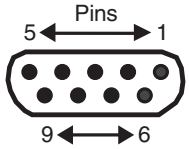
2.1.5 Adapter Wiring and Signal Assignments

Console Port Adapter Wiring and Signal Diagram			
RJ45		**DB9**	
Pin	Conductor	Pin	Signal
1	Blue	2	Receive (RX)
4	Red	3	Transmit (TX)
5	Green	5	Ground (GRD)
2	Orange	7	Request to Send (RTS)
6	Yellow	8	Clear to Send (CTS)



RJ45 Connector (Female)

045905



DB9 Connector (Female)

045904

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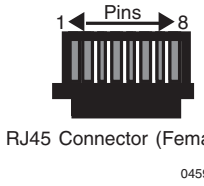
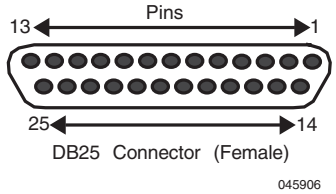
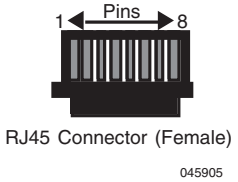
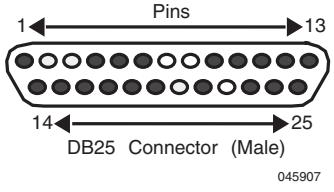
VT Series Port Adapter Wiring and Signal Diagram			
RJ45		**DB25**	
Pin	Conductor	Pin	Signal
4	Red	2	Transmit (TX)
1	Blue	3	Receive (RX)
6	Yellow	5	Clear to Send (CTS)
5	Green	7	Ground (GRD)
2	Orange	20	Data Terminal Ready





Modem Port Adapter Wiring and Signal Diagram			
RJ45		**DB25**	
Pin	Conductor	Pin	Signal
1	Blue	2	Transmit (TX)
2	Orange	8	Data Carrier Detect (DCD)
4	Red	3	Receive
5	Green	7	Ground (GRD)
6	Yellow	20	Data Terminal Ready (DTR)
8	Gray	22	Ring Indicator





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3

Startup and General Configuration

This chapter describes factory default settings and the Startup and General Configuration set of commands.

3.1 STARTUP AND GENERAL CONFIGURATION SUMMARY

At startup, the Matrix E1 device is configured with many defaults and standard features. The following sections provide information on how to review and change factory defaults, how to customize basic system settings to adapt to your work environment, and how to prepare to run the device in router mode.

3.1.1 Factory Default Settings

The following tables list factory default device settings available on the Matrix E1. Table 3-1 lists default settings for basic operation and for when the device is in switch mode. Table 3-2 lists default settings for router mode operation.

Table 3-1 Default Device Settings for Basic and Switch Mode Operation

Device Feature	Default Setting
802.1X	Disabled.
CDP (Enterasys) Discovery Protocol	Auto enabled on all ports.
CDP interval	Transmit frequency of CDP messages set to **60** seconds.
Cisco Discovery Protocol	Disabled.
DNS	Enabled.
Community name	Public.

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Table 3-1 Default Device Settings for Basic and Switch Mode Operation (Continued)

Device Feature	Default Setting
Convergence End Points phone detection	Disabled globally and on all ports.
EAPOL	Disabled.
EAPOL authentication mode	When enabled, set to **auto** for all ports.
Flow age time	Set to **30** seconds
Flow Setup Throttling (FST)	Disabled. When enabled, the flow limit notification and shutdown functions are disabled. The notification interval is set to **120** seconds and maximum flow count is set to **128000** seconds.
GARP timer	Join timer set to **20** centiseconds; leave timer set to **60** centiseconds; leaveall timer set to **1000** centiseconds.
GVRP	Globally enabled.
Host VLAN	Assigned to default (VID 1) VLAN.
IGMP	Disabled. When enabled, query interval is set to **125** seconds and response time is set to **100** tenths of a second.
IP mask and gateway	Subnet mask set to **255.255.0.0**; default gateway set to **0.0.0.0**
IP routes	No static routes configured.
Jumbo frame support	Disabled on all ports.
Link aggregation (LACP)	LACP is enabled on all ports.
Lockout	Set to disable Read-Write and Read-Only users, and to lockout the default admin (Super User) account for 15 minutes, after 3 failed login attempts,
Logging	Syslog port set to UDP port number **514**. Logging severity level set to **5** (warning conditions) for all applications.
MAC aging time	Set to 300 seconds.

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Table 3-1 Default Device Settings for Basic and Switch Mode Operation (Continued)

Device Feature	Default Setting
MAC authentication	Disabled (globally and on all ports).
MAC locking	Disabled (globally and on all ports).
MAC reauthentication	Disabled on all ports. When enabled, reauthentication period and quiet period are set to **30** seconds.
Passwords	Set to an empty string for all default user accounts. User must press ENTER at the password prompt to access CLI.
Password aging	Disabled.
Password history	No passwords are checked for duplication.
Port auto-negotiation	Enabled on all ports.
Port advertised ability	Enabled on all ports.
Port broadcast suppression	Disabled (no broadcast limit).
Port duplex mode	Set to **half** for 10BASE-T and 100BASE-TX; set to **full** for 1000BASE-X.
Port enable/disable	Enabled.
Port priority	Set to **1**.
Port rate limiting	Disabled.
Port speed	Set to **10** mbps for 10BASE-T; **100** for 100BASE-TX; and **1000** for 1000BASE-X and 1000BASE-TX.
Port trap	All port link traps are enabled.
Priority classification	Classification rules are automatically enabled when created.
Priority classification (802.1p) tag override	Disabled on all ports.
QoS hybrid	Set to **25**% for weighted queues (1 through 4).

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Table 3-1 Default Device Settings for Basic and Switch Mode Operation (Continued)

Device Feature	Default Setting
QoS weight round-robin (WRR)	Set to **25**% for weighted queues (0 through 3).
RAD	Enabled.
RADIUS client	Disabled.
RADIUS last resort action	When the client is enabled, set to **Challenge**.
RADIUS retries	When the client is enabled, set to **3**.
RADIUS timeout	When the client is enabled, set to **20** seconds.
Rate limiting	Disabled (globally and on all ports).
SNMP	Enabled.
SNTP	Disabled.
Spanning Tree	Enabled (globally and on all ports).
Spanning Tree edge port administrative status	Disabled.
Spanning Tree edge port delay	Enabled.
Spanning Tree forward delay	Set to **15** seconds.
Spanning Tree hello interval	Set to **2** seconds.
Spanning Tree ID (SID)	Set to **1**.
Spanning Tree legacy path cost	Enabled.

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Table 3-1 Default Device Settings for Basic and Switch Mode Operation (Continued)

Device Feature	Default Setting
Spanning Tree maximum aging time	Set to **20** seconds.
Spanning Tree path cost	Set to **100** for Ethernet; **10** for Fast Ethernet; and **1** for Gigabit Ethernet.
Spanning Tree point-to-point	Set to **auto** for all Spanning Tree ports.
Spanning Tree port priority	All ports with bridge priority are set to **128** (medium priority).
Spanning Tree priority	Bridge priority is set to **32768**.
Spanning Tree real time BPDU message age mode	Disabled.
Spanning Tree topology change trap suppression	Enabled on edge ports.
Spanning Tree transmit hold count	Set to **3**.
Spanning Tree version	Set to **mstp** (Multiple Spanning Tree).
SSH (Secure Shell)	Enabled with the following settings: Listening port: **22**. Rekey interval: **3600** seconds. Login grace time: **60** seconds. Authentication attempts allowed: **3**. Nagle's algorithm enabled.
System baud rate	Set to **9600** baud.
System contact	Set to a blank string.
System location	Set to a blank string.
System name	Set to a blank string.

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Table 3-1 Default Device Settings for Basic and Switch Mode Operation (Continued)

Device Feature	Default Setting
Telnet	Enabled (outbound and inbound). Listening port is set to **23**. Maximum number of inbound, outbound, or SSH sessions allowed is set to **4**.
Terminal	CLI display set to **79** columns and **23** rows.
Timeout	Set to **5** minutes.
User names	Login accounts set to **ro** for Read-Only access; **rw** for Read-Write access; and **admin** for Super User access.
VLAN classification	Classification rules are automatically enabled when created.
VLAN dynamic egress	Disabled.
VLAN ID	All ports use a VLAN identifier of **1**, and are included on the host VLAN ID 1 port VLAN list.
WebView	Enabled.
WebView port	Set at TCP port number **80**.

Table 3-2 Default Device Settings for Router Mode Operation

Device Feature	Default Setting
Access groups (IP security)	None configured.
Access lists (IP security)	None configured.
Area authentication (OSPF)	Disabled.
Area default cost (OSPF)	Set to **1**.
Area NSSA (OSPF)	None configured.
Area range (OSPF)	None configured.

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Table 3-2 Default Device Settings for Router Mode Operation (Continued)

Device Feature	Default Setting
ARP table	No permanent entries configured.
ARP timeout	Set to **1200** seconds (20 minutes).
Authentication key (RIP and OSPF)	None configured.
Authentication mode (RIP and OSPF)	None configured.
Dead interval (OSPF)	Set to **40** seconds.
Disable triggered updates (RIP)	Triggered updates allowed.
Distribute list (RIP)	No filters applied.
DoS prevention	Disabled.
DVMRP	Disabled. Metric set to **1**.
Hello interval (OSPF)	Set to **10** seconds for broadcast and point-to-point networks. Set to **30** seconds for non-broadcast and point-to-multipoint networks.
Host name	System command prompt set to **Matrix>Router**.
ICMP	Enabled on routing interfaces for both echo-reply and mask-reply modes.
IP-directed broadcasts	Disabled.
IP forward-protocol	Enabled with no port specified.
IP interfaces	Disabled with no IP addresses specified.
IRDP	Disabled on all interfaces. When enabled, maximum advertisement interval is set to **600** seconds, minimum advertisement interval is set to **450** seconds, holdtime is set to **1800** seconds, and address preference is set to **0**.
Logging	Enabled to send event notification messages to Syslog, buffer, console, and Telnet, with severity level set to high.

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Table 3-2 Default Device Settings for Router Mode Operation (Continued)

Device Feature	Default Setting
MD5 authentication (OSPF)	Disabled with no password set.
MTU size	Set to **1500** bytes on all interfaces.
OSPF	Disabled.
OSPF cost	When OSPF is enabled, set to **10** for all OSPF interfaces.
OSPF network	None configured.
OSPF priority	Set to **1**.
Passive interfaces (RIP)	None configured.
Proxy ARP	Enabled on all interfaces.
Receive interfaces (RIP)	Enabled on all interfaces.
Retransmit delay (OSPF)	Set to **1** second.
Retransmit interval (OSPF)	Set to **5** seconds.
RIP	Enabled.
RIP receive version	Set to accept both version **1** and version **2**.
RIP send version	Set to version **1**.
RIP timers	Update timer set to **30** (seconds); invalid timer set to **180**; hold down timer set to **120**; flush timer set to **300**.
RIP offset	No value applied.
Split horizon	Enabled for RIP packets without poison reverse.
Stub area (OSPF)	None configured.
Telnet	Enabled (inbound and outbound).

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Table 3-2 Default Device Settings for Router Mode Operation (Continued)

Device Feature	Default Setting
Telnet port (IP)	Set to port number **23**.
TFTP server IP address	Set to **0.0.0.0**
Timers (OSPF)	SPF delay set to **5** seconds. SPF holdtime set to **10** seconds.
Transmit delay (OSPF)	Set to **1** second.
VRRP	Disabled.

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3.1.2 Command Defaults Descriptions

Each command description in this guide includes a section entitled “Command Defaults” which contains different information than the factory default settings on the device as described in Table 3-1 and Table 3-2. The command defaults section defines CLI behavior if the user enters a command without optional parameters (indicated by square brackets [ ]). For commands without optional parameters, the defaults section lists “None”. For commands with optional parameters, this section describes how the CLI responds if the user opts to enter only the keywords of the command syntax. Figure 3-1 provides an example.

Figure 3-1 Sample Command Default Description

show port status [*port-string*]

Command Defaults

If *port-string* is not specified, status information for all ports will be displayed.

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3.1.3 CLI Command Modes

Each command description in this guide includes a section entitled “Command Mode” which states whether the command is executable in Admin (Super User), Read-Write or Read-Only mode. Users with Read-Only access will only be permitted to view Read-Only (**show**) commands. Users with Read-Write access will be able to modify all modifiable parameters in **set** and **show** commands, as well as view Read-Only commands. Administrators or Super Users will be allowed all Read-Write and Read-Only privileges, and will be able to modify local user accounts.

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3.1.4 Using WebView

NOTE: This guide describes configuring and managing the Matrix E1 device using CLI commands. For details on using WebView (Enterasys Networks' embedded web server) for switch configuration and management tasks, refer to the *Matrix E1 (IG582-09 and 1H582-51) WebView User's Guide.* WebView is not available as a router configuration tool.

By default WebView is enabled on TCP port number 80 of the Matrix E1 device. You can verify WebView status, enable or disable WebView, and reset the WebView port as described in the following section.

Displaying WebView status:

To display WebView status, enter **show webview** at the CLI command prompt.

This example shows that WebView is enabled on TCP port 80, the default port number.

```
Matrix>show webview
 Webview is currently enabled on port 80.
```

Enabling / disabling WebView:

To enable or disable WebView, enter **set webview** {**enable** | **disable**} at the CLI command prompt.

This example shows how to enable WebView.

```
Matrix>set webview enable
```

Setting the WebView port:

To set a different TCP port through which to run WebView, enter **set webview port** *webview_port* at the CLI command prompt. *Webview_port* must be a number value from 1 to 65535; specifying the WebView TCP port.

This example shows how to set the WebView TCP port to 100.

```
Matrix>set webview port 100
```


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3.1.5 Process Overview: CLI Startup and General Configuration

Use the following steps as a guide to the startup and general configuration process:

1. Starting and navigating the Command Line Interface (CLI) (Section 3.1.6)
2. Setting user accounts and passwords (Section 3.2.1)
3. Setting basic device properties (Section 3.2.2)
4. Downloading a new firmware image (Section 3.2.3)
5. Configuring Telnet (Section 3.2.4)
6. Managing switch configuration files (Section 3.2.5)
7. Configuring Enterasys and Cisco discovery protocols (Section 3.2.6)
8. Pausing, clearing and closing the CLI (Section 3.2.7)
9. Resetting the device (Section 3.2.8)
10. Preparing the device for router mode (Section 3.3)

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3.1.6 Starting and Navigating the Command Line Interface (CLI)

3.1.6.1 Using a Console Port Connection

NOTE: By default, the Matrix E1 Series device is configured with three user login accounts: **ro** for Read-Only access; **rw** for Read-Write access; and **admin** for super-user access to all modifiable parameters. The default password is set to a blank string (carriage return). For information on changing these default settings, refer to Section 3.2.1.

Once you have connected a terminal to the local console port as described in Chapter 2, the initial startup screen, Figure 3-2, will display. You can now start the Command Line Interface (CLI) by

- Using a default user account, as described in Section 3.1.6.2, or
- Using an administratively-assigned user account as described in Section 3.1.6.3.

3.1.6.2 Logging in with a Default User Account

If this is the first time your are logging in to the Matrix E1 Series device, or if the default user accounts have not been administratively changed, proceed as follows:

1. At the Username login prompt, enter one of the following default user names:
   - **ro** for Read-Only access,
   - **rw** for Read-Write access.
   - **admin** for Super User access.
2. Press ENTER. The Password prompt displays.
3. Leave this string blank and press ENTER.The notice of authorization and the Matrix prompt displays as shown in Figure 3-3.

NOTES: Display messages shown in Figure 3-2 about the device generating keys pertain to Secure Shell (SSH) authentication. These lines will only display on the startup screen the first time the device is powered on, or after NVRAM has been cleared.

Once the device has been configured for routing as described in Section 3.3, the message “cannot open startup.cfg file” will no longer display. The startup.cfg file stores the running configuration for the device when operating in router mode. This file does not affect switch mode operation.

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Figure 3-2 Console Port Initial Startup Screen Before User Authorization

```
c)Copyright ENTERASYS Networks, Inc. 2002
Matrix 1G582-09
POST Version 01.01.00

Application image found in Flash memory.
Loading functional image ...

Application image loaded to CPU SDRAM.
Start Application ...
done.

1H582-51
Switch init start...
Switch Budget init...
Initializing hardware...
Switch clear VLAN table...
Initializing databases...
Generating 1024-bit dsa key pair

Key generated.
1024-bit dsa
Private key saved to sshdrv:/.ssh2/dsa
Public key saved to sshdrv:/.ssh2/dsa.pub
Generating 1024-bit rsa key pair

Key generated.
1024-bit rsa
Private key saved to sshdrv:/hostkey
Public key saved to sshdrv:/hostkey.pub

Initializing router...

Can not open startup.cfg file! It may have not been generated yet.

Username:
```


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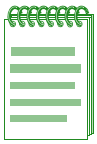
3.1.6.3 Logging in With an Administratively Configured User Account

If the device's default user account settings have been changed, proceed as follows:

1. At the Username login prompt, enter your administratively-assigned user name and press ENTER.
2. At the Password prompt, enter your password and press ENTER.

The notice of authorization and the Matrix prompt displays as shown in Figure 3-3.



NOTE: Users with Read-Write (rw) and Read-Only access can use the **set password** command (Section 3.2.7) to change their own passwords. Administrators with Super User (su) access can use the **set system login** command (Section 3.2.1.2) to create and change user accounts, and the **set password** command to change any local account password.

3.1.6.4 Using a Telnet Connection

Once the Matrix E1 device has a valid IP address, you can establish a Telnet session from any TCP/IP based node on the network as follows.

1. Telnet to the device's IP address.
2. Enter login (user name) and password information in one of the following ways:
   - If the device's default login and password settings have not been changed, follow the steps listed in Section 3.1.6.2, or
   - Enter an administratively-configured user name and password.

The notice of authorization and the Matrix prompt displays as shown in Figure 3-3.

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Figure 3-3 Startup Screen After User Authorization

```
Username:rw
Password:
waiting for authorization......

****************************************
*                                      *
*          Matrix 1G587-09             *
*                                      *
*      Enterasys Networks, Inc.        *
*         50 Minuteman Road            *
*       Andover, MA 01810 USA          *
*                                      *
****************************************

Matrix>
```

For information about setting the IP address, refer to Section 3.2.2.23.

For information about configuring Telnet settings, refer to Section 3.2.4.2.

Refer to the instructions included with the Telnet application for information about establishing a Telnet session.

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3.1.7 Getting Help with CLI Syntax

Entering a space and a question mark (**?**) after a keyword will display all commands beginning with the keyword. Figure 3-4 shows how to perform a keyword lookup for **set vlan**. Entering a space and a question mark (**?**) after any of these parameters (such as **set vlan classification**) will display additional parameters nested within the syntax.

Figure 3-4 Performing a Key Word Lookup

```
Matrix>set vlan ?
<1-4094>        <vlan_num>
classification  Use the set vlan classification command to create
                a classification rule that will assign untagged
                traffic to a vlan based on Layer 2/3/4 rules.
dynamicegress   Use the set vlan dynamicegress command to enable
                or disable the ability to create vlans
                dynamically based on incoming frames.
egress          Use the set vlan egress command to add a single
                port or a range of ports to a VLAN's egress list.
forbidden       Use the set vlan forbidden command to add a single
                port or a range of ports to a VLAN's forbidden
                list.
name            Use the set vlan name command to set the ASCII
                name for an existing VLAN.
Matrix>set vlan classification ?
  <1-4094>  <vlan_num>
  disable
  enable
 ingress   Use the set vlan classification ingress command to add
           ports to a vlan classification rule.
Matrix>set vlan classification
```

Entering a question mark (**?**) without a space after a partial keyword will display a list of commands that begin with the partial keyword. Figure 3-5 shows how to use this function for all commands beginning with **co**:

Figure 3-5 Performing a Partial Keyword Lookup

```
Matrix>co?
configure copy
Matrix-E1>co
```


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3.1.8 Displaying Scrolling Screens

CLI output requiring more than one screen will display `--More--` to indicate continuing screens. To display additional screen output:

- Press ENTER to advance the output one line at a time.
- Press **M** to advance the output to the next screen.

The example in Figure 3-6 shows how the **show mac** command indicates that output continues on more than one screen.

Figure 3-6 Scrolling Screen Output

```
Matrix>show mac
 Dynamic Address Counts : 103    Static Address Counts : 2
 ------------------------------------------------------------
 MAC Address           FID       Port      Type
 ------------------------------------------------------------
 00-00-1d-67-68-69      1       host.0.1  self
 00-00-02-00-00-00      1       ge.0.2    learned
 00-00-02-00-00-01      1       ge.0.2    learned
 00-00-02-00-00-02      1       ge.0.2    learned
 00-00-02-00-00-03      1       ge.0.2    learned
 00-00-02-00-00-04      1       ge.0.2    learned
 00-00-02-00-00-05      1       ge.0.2    learned
 00-00-02-00-00-06      1       ge.0.2    learned
 00-00-02-00-00-07      1       ge.0.2    learned
 00-00-02-00-00-08      1       ge.0.2    learned
 00-00-02-00-00-09      1       ge.0.2    learned
 00-00-02-00-00-0a      1       ge.0.2    learned
 00-00-02-00-00-0b      1       ge.0.2    learned
 00-00-02-00-00-0c      1       ge.0.2    learned
 00-00-02-00-00-0d      1       ge.0.2    learned
--More--
```

To disable the `--More--` feature on continuing screens, use the set terminal command as described in Section 3.2.2.14.

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3.1.9 Basic Line Editing Commands

The CLI supports EMACs-like line editing commands. Table 3-3 lists some commonly used commands.

Table 3-3 Basic Line Editing Commands

Key Sequence	Command
Ctrl+A	Move cursor to beginning of line.
Ctrl+B	Move cursor back one character.
Ctrl+C	Abort command.
Ctrl+D	Delete character.
Ctrl+E	Move cursor to end of line.
Ctrl+F	Move cursor forward one character.
Ctrl+H	Delete character to left of cursor.
Ctrl+I or TAB key	Command completion.
Ctrl+K	Delete all characters after cursor.
Ctrl+L or Ctrl+R	Re-display line.
Ctrl+N	Scroll to next command in command history (use the CLI **show history** command to display the history).
Ctrl+P	Scroll to previous command in command history.
Ctrl+T	Transpose characters.
Ctrl+U	Erase entire line.
Ctrl+W	Delete word to the left of cursor.
Ctrl+X	Delete all characters before the cursor.
Ctrl+Y	Restore the most recently deleted item.
Ctrl+Z	Delete all characters before the cursor.

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3.2 GENERAL CONFIGURATION COMMAND SET

3.2.1 Setting User Accounts and Passwords

Purpose

To change the device's default user login and password settings, and to add new user accounts and passwords.

Commands

The commands needed to set user accounts and passwords are listed below and described in the associated section as shown.

- show system login (Section 3.2.1.1)
- set system login (Section 3.2.1.2)
- clear system login (Section 3.2.1.3)
- set password (Section 3.2.1.4)
- set system password length (Section 3.2.1.5)
- set system password aging (Section 3.2.1.6)
- set system password history (Section 3.2.1.7)
- set system lockout attempts (Section 3.2.1.8)
- set system lockout (Section 3.2.1.9)

3.2.1.1 show system login

Use this command to display user login account information.

show system login

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to display login account information. In this case, device defaults have not been changed:

```
Matrix>show system login
Password history size: 0
Password aging : disabled
Password length : 0
Lockout time : 15
Lockout attempts : 3

User            Privileges   Status
-------------------------------------
admin           su           enabled
rw              rw           enabled
ro              ro           enabled
```

Table 3-5 provides an explanation of the command output.

Table 3-4 show system login Output Details

Output	What It Displays...
Password history size	Number of user login passwords that will be checked for duplication when the **set password** command is executed. Configured with the **set system password history** command (Section 3.2.1.7).
Password aging	Number of days user passwords will remain valid before aging out. Configured with the **set system password aging** command (Section 3.2.1.6).
Password length	Minimum number of characters required for a login password. Configured with the set system password length command (Section 3.2.1.5).

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Table 3-4 show system login Output Details (Continued)

Output	What It Displays...
Lockout time	Number of minutes the admin user account will be locked out after the maximum number of failed attempts to log on to the switch. Configured with the **set system lockout** command (Section 3.2.1.9).
Lockout attempts	Number of failed login attempts before user lock out occurs. Configured with the **set system lockout attempts** command (Section 3.2.1.8).
User	Login user names.
Privileges	Access assigned to this user account: **su (**Super User), **rw (**Read-Write or **ro (**Read-Only**)**.
Status	Whether this user account is **enabled** or **disabled**.

3.2.1.2 set system login

Use this command to create a new user login account, or to disable or enable an existing account. The Matrix E1 Series device supports up to 16 user accounts, including the admin account, which cannot be disabled or deleted.

set system login *username* {**su** | **rw** | **ro**} {**enable** | **disable**}

Syntax Description

username	Specifies a login name for a new or existing user.
su | **rw** | **ro**	Applies super-user, Read-Write or Read-Only access privileges to this user.
enable | **disable**	Enables or disables the user account. **NOTE:** The default admin (su) account cannot be disabled.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Super User.

Example

This example shows how to enable a new user account with the login name “netops” with super user access privileges:

```
Matrix>set system login netops su enable
```

3.2.1.3 clear system login

Use this command to remove a local login user account.

clear system login *username*

Syntax Description

username	Specifies the login name of the account to be cleared.
	NOTE: The default admin (su) account cannot be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to remove the “netops” user account:

```
Matrix>clear system login netops
```


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3.2.1.4 set password

Use this command to change system default passwords or to set a new login password on the CLI.

set password *username*

NOTES: Only users with admin (**su**) access privileges can change any password on the system.

Users with Read-Write (**rw**) or Read-Only (**ro**) access privileges can change their own passwords, but cannot enter or modify other system passwords.

If configured, password length must conform to the minimum number of characters set with the set system password length command (Section 3.2.1.5).

The **admin** password can be reset by toggling dip switch 8 on the device as described in the *Matrix E1 Series Installation Guide*.

Syntax Description

username	(Only available to users with super-user access.) Specifies a system default or a user-configured login account name. By default, the Matrix E1 Series device provides the following account names: • **ro** for Read-Only access, • **rw** for Read-Write access. • **admin** for Super User access. (This access level allows Read-Write access to all modifiable parameters, including user accounts.)

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write users can change their own passwords. Super Users (Admin) can change any password on the system.

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Examples

This example shows how a super-user would change the Read-Write password from the system default (blank string):

```
Matrix>set password rw
Please enter new password: ********
Please re-enter new password: ********
Password changed.
```

This example shows how a user with Read-Write access would change his password:

```
Matrix>set password
Please enter old password: ********
Please enter new password: ********
Please re-enter new password: ********
Password changed.
```

3.2.1.5 set system password length

Use this command to set the minimum user login password length.

set system password length *characters*

Syntax Description

characters	Specifies the minimum number of characters for a user account password. Valid values are 0 to 32.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to set the minimum system password length to 8 characters:

```
Matrix>set system password length 8
```


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3.2.1.6 set system password aging

Use this command to set the number of days user passwords will remain valid before aging out, or to disable user account password aging.

set system password aging {*days* | **disable**}

Syntax Description

days	Specifies the number of days user passwords will remain valid before aging out. Valid values are 1 to 365.
disable	Disables password aging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to set the system password age time to 45 days:

```
Matrix>set system password aging 45
```

3.2.1.7 set system password history

Use this command to set the number of user login passwords that will be checked for password duplication. This prevents duplicate passwords from being entered into the system with the **set password** command.

set system password history *size*

Syntax Description

size	Specifies the number of passwords checked for duplication. Valid values are 0 to 10.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to configure the system to check the last 10 passwords for duplication

```
Matrix>set system password history 10
```

3.2.1.8 set system lockout attempts

Use this command to disable system lock out or to set the number of failed login attempts before user lock out occurs. When the number of attempts is reached, Read-Write and Read-Only user accounts will be disabled, and the admin account will be locked out for the number of minutes specified by the **set system lockout** command (Section 3.2.1.9). Once a user account is locked out, it can only be re-enabled by a super user with the **set system login** command (Section 3.2.1.2).

set system lockout attempts {*attempts* | **disable**}

Syntax Description

attempts	Specifies the number of failed login attempts allowed before a Read-Write or Read-Only user's account will be disabled. Valid values are **1** to **10**.
disable	Disables user lock out on the device. If specified, no accounts will ever be disabled or locked out.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

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Example

This example shows how to set login attempts to 5:

```
Matrix>set system lockout attempts 5
```

3.2.1.9 set system lockout

Use this command to set the number of minutes the admin user account will be locked out after the maximum number of failed attempts to log on to the switch.

set system lockout *time*

Syntax Description

time	Specifies the number of minutes the default admin user account will be locked out after the maximum login attempts.Valid values are **0** to **60**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows how to set lockout time to 30 minutes:

```
Matrix>set system lockout 30
```


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3.2.2 Setting Basic Device Properties

Purpose

To display and set the basic system (device) information, including password, system time, system prompt, contact name, terminal output, lockout time, timeout, console baud rate and version information, to display or set the system IP address, and to download a new firmware image to the device.

Commands

The commands needed to set basic system information are listed below and described in the associated section as shown.

- show system resources (Section 3.2.2.1)
- show time (Section 3.2.2.3)
- set time (Section 3.2.2.4)
- set prompt (Section 3.2.2.5)
- show banner motd (Section 3.2.2.6)
- set banner motd (Section 3.2.2.7)
- clear banner motd (Section 3.2.2.8)
- show version (Section 3.2.2.9)
- set system name (Section 3.2.2.10)
- set system location (Section 3.2.2.11)
- set system contact (Section 3.2.2.12)
- show terminal (Section 3.2.2.13)
- set terminal (Section 3.2.2.14)
- set system timeout (Section 3.2.2.15)
- set console baud (Section 3.2.2.21)
- show ip address (Section 3.2.2.22)
- set ip address (Section 3.2.2.23)

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3.2.2.1 show system resources

Use this command to display the CPU type, NVRAM installed and other resources installed in the system.

show system resources

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display system resources:

```
Matrix>show system resources
 Cpu Type :  MPC8245    300 MHz

 Local Memory Installed :  64 MB
 Local Memory Used :  56015752 Bytes

 Installed NVRAM :  1024 kB
 Used NVRAM :  902144 Bytes

 Installed Flash :  8192 kB
 Used Flash :  6580072 Bytes

 Switch Load :  0%
 Switch Peak Load :  0%
 Switch Peak Load Time :  3 days, 7 hours, 23 minutes, 6 seconds
```


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3.2.2.2 show system

Use this command to display powers supply status, baud rate, timeout and other system information.

show system

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display system information:

```
Matrix>show system
 Power Supply Status
 ------------------------
 PS1 - Non-Operational
 PS2 - Operational

 System Baud : 9600                System Timeout : 60 minutes.

 System Lockout Time : 15 minutes.

 System Uptime : 0 days, 1 hours, 15 minutes, 35 seconds

 System Name              System Location          System Contact
 ------------------------ ------------------------ ------------------------
 sysName                  sysLocation              sysContact

Boot Configuration: Boot from Flash
```


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3.2.2.3 show time

Use this command to display the current time of day in the system clock.

show time

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current time. The output shows the day of the week, month, day, year, hour, minutes, and seconds:

```
Matrix>show time
 Thu 11/06/2001 08:24:28
```

3.2.2.4 set time

Use this command to change the time of day on the system clock.

set time {[*day_of_week*][*mm/dd/yyyy*][*hh:mm:ss*]}

Syntax Description

day_of_week	(Optional) Specifies the day of the week.
mm/dd/yyyy	(Optional) Specifies the month, day, and year.
hh:mm:ss	(Optional) Specifies the current time in 24-hour format.

Command Defaults

At least one of the three optional parameters must be specified.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set the system clock to Saturday, October 31, 2003, 7:50 a.m:

```
Matrix>set time sat 10/31/2003 7:50
```

3.2.2.5 set prompt

Use this command to modify the command prompt.

set prompt "*prompt_string*"

Syntax Description

prompt_string	Specifies a text string for the command prompt. A prompt string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the command prompt to Switch 1:

```
Matrix>set prompt "Switch 1"
Switch 1>
```


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3.2.2.6 show banner motd

Use this command to show the banner message of the day that will display at session login.

show banner motd

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the banner message of the day:

```
Matrix>show banner motd
Not one hundred percent efficient, of course ... but nothing ever is.
                -- Kirk, "Metamorphosis", stardate 3219.8
```

3.2.2.7 set banner motd

Use this command to set the banner message of the day displayed at session login.

set banner motd *message*

Syntax Description

message	Specifies a message of the day. This is a text string that can be formatted with a new line escape (**n**) character. A string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set the message of the day banner to read “Change is the price of survival.
-- Winston Churchill” :

```
Matrix>set banner motd “Change is the price of survival.\\n-- Winston Churchill”
```

3.2.2.8 clear banner motd

Use this command to clear the banner message of the day displayed at session login.

clear banner motd

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the message of the day banner:

```
Matrix>clear banner motd
```


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3.2.2.9 show version

Use this command to display hardware and firmware information. Refer to Section 3.2.3 for instructions on how to download a firmware image. If a firmware image has been downloaded to the switch since the last reboot, a message will be displayed indicating that fact. If no download has taken place, no message will be displayed.

show version

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display version information. This example illustrates the message that is displayed if a firmware image has been downloaded to the switch since the last reboot.

```
Matrix>show version

 Boot Prom Version: 01.01.00
 Slot   Ports     Model     Serial Number   HW Version   FW Version
 ----   -----   ---------   -------------   ----------   -----------
 0      48      1H582-51    03032222210N     0           03.04.04
 1      8       1H-8FX      N/A              N/A         N/A
 2      2       1G-2TX      N/A              N/A         N/A
 3      2       1G-2GBIC    N/A              N/A         N/A

Note: Image file firmware/images/03_05_06.fls has been downloaded
and will take effect on next reset.
```

Table 3-5 provides an explanation of the command output.

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Table 3-5 show version Output Details

Output	What It Displays...
Slot	Fixed front panel or expansion module slot location designation. For details on how slots are numbered, refer to Section 4.1.2.
Ports	Number of ports in the fixed front panel or expansion module.
Model	Model number of the chassis or expansion module.
Serial Number	Serial number (if applicable) of the chassis or expansion module.
HW Version	Hardware version number (if applicable) of the chassis or expansion module.
FW Version	Current firmware version number (if applicable).

3.2.2.10 set system name

Use this command to configure a name for the system.

set system name [“*name_string*”]

Syntax Description

name_string	(Optional) Specifies a text string that identifies the system. A name string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *name_string* is not specified, the system name will be set to a blank string.

Command Type

Switch command.

Command Mode

Read-Write.

Usage Guidelines

None.

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Example

This example shows how to set the system name to Information Systems:

```
Matrix>set system name “Information Systems”
```

3.2.2.11 set system location

Use this command to identify the location of the system.

set system location [“*location_string*”]

Syntax Description

location_string	(Optional) Specifies a text string that indicates where the system is located. A location string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *location_string* is not specified, the system location will be set to a blank string.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system location string:

```
Matrix>set system location “Bldg N32-04 Closet 9 Alpha Sierra”
```


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3.2.2.12 set system contact

Use this command to identify a contact person for the system.

set system contact [“*contact_string*”]

Syntax Description

contact_string	(Optional) Specifies a text string that contains the name of the person to contact for system administration. A contact string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

If *contact_string* is not specified, the contact name will be set to a blank string.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system contact string:

```
Matrix>set system contact “Joe Smith”
```

3.2.2.13 show terminal

Use this command to display the number of columns and rows for the terminal connected to the device’s console port. This information is used to control the output of the CLI itself.

show terminal

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to show terminal information:

```
Matrix>show terminal
Terminal height set to 23.
Terminal width  set to 79.
```

3.2.2.14 set terminal

Use this command to set the number of columns and rows for the terminal connected to the device's console port.

set terminal {**rows** *num-rows* [**disable**] | **cols** *num-cols*}[**static**]

Syntax Description

rows *num_rows*	Specifies the number of terminal rows to be set. Valid values are **2** to **200**.
disable	Disables the `--More--` line from displaying on scrolling screens as described in Section 3.1.8.
cols *num_cols*	Specifies the number of terminal columns to be set. Valid values are **2** to **100**.
static	(Optional) Specifies that terminal settings will remain as set for all future sessions.

Command Defaults

- If disable is not specified, `--More--` will display at the bottom of scrolling screen output.
- If **static** is not specified, terminal settings will apply only to the current session.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the terminal columns to 50:

```
Matrix>set terminal cols 50
```

3.2.2.15 set system timeout

Use this command to set the time (in minutes) an idle local (console) or remote login session will remain connected before timing out.

set system timeout *timeout* [**console** | **remote**]

Syntax Description

timeout	Specifies the number of minutes the system will remain idle before timing out. Valid values are **1** to **60**.
console | **remote**	(Optional) Sets the console or remote (Telnet) timeout.

Command Defaults

If **console** or **remote** are not specified, both timeout values will be set.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the system timeout for both console and remote logins to 10 minutes:

```
Matrix>set system timeout 10
```

3.2.2.16 show summertime

Use this command to display daylight savings time settings.

show summertime

Syntax Description

None.

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Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display daylight savings time settings:

```
Matrix>show summertime
Summertime is disabled and set to ''
Start : SUN APR 04 02:00:00 2004
End   : SUN OCT 31 02:00:00 2004
Offset: 60 minutes (1 hours 0 minutes)
Recurring: yes, starting at 2:00 of the first Sunday of April and ending at 2:00
 of the last Sunday of October
```

3.2.2.17 set summertime

Use this command to enable or disable the daylight savings time function.

set summertime {**enable** | **disable**} [*zone*]

Syntax Description

enable | **disable**	Enables or disables the daylight savings time function.
zone	(Optional) Applies a name to the daylight savings time settings.

Command Defaults

If a *zone* name is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to enable daylight savings time function:

```
Matrix> set summertime enable
```

3.2.2.18 set summertime date

Use this command to configure specific dates to start and stop daylight savings time. These settings will be non-recurring and will have to be reset annually. Use the **set summertime recurring** command to configure recurring summertime that will not have to be reset annually.

set summertime date *start_month start_date start_year start_hr_min end_month end_date end_year end_hr_min* [*offset_minutes*]

Syntax Description

start_month	Specifies the month of the year to start daylight savings time.
start_date	Specifies the day of the month to start daylight savings time.
start_year	Specifies the year to start daylight savings time.
start_hr_min	Specifies the time of day to start daylight savings time. Format is hh:mm.
end_month	Specifies the month of the year to end daylight savings time.
end_date	Specifies the day of the month to end daylight savings time.
end_year	Specifies the year to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are **1** - **1440**.

Command Defaults

If an *offset* is not specified, none will be applied.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a daylight savings time start date of April 4, 2004 at 2 a.m. and an ending date of October 31, 2004 at 2 a.m. with an offset time of one hour:

```
Matrix>set summertime date April 4 2004 02:00 October 31 2004 02:00 60
```

3.2.2.19 set summertime recurring

Use this command to configure recurring daylight savings time settings. These settings will start and stop daylight savings time at the specified day of the month and hour each year and will not have to be reset annually.

set summertime recurring *start_week start_day start_month start_hr_min end_week end_day end_month end_hr_min* [*offset_minutes*]

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Syntax Description

start_week	Specifies the week of the month to start daylight savings time. Valid values are: **first**, **second**, **third**, **fourth**, and **last**.
start_day	Specifies the day of the week to start daylight savings time.
start_hr_min	Specifies the time of day to start daylight savings time. Format is hh:mm.
end_week	Specifies the week of the month to end daylight savings time.
end_day	Specifies the day of the week to end daylight savings time.
end_hr_min	Specifies the time of day to end daylight savings time. Format is hh:mm.
offset_minutes	(Optional) Specifies the amount of time in minutes to offset daylight savings time from the non-daylight savings time system setting. Valid values are **1** - **1440**.

Command Defaults

If an *offset* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how set daylight savings time to recur with a start date of April 4, 2004 at 2 a.m. and an ending date of October 31, 2004 at 2 a.m. with an offset time of one hour:

```
Matrix>set summertime recurring first Sunday April 02:00 last Sunday October
02:00 60
```


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3.2.2.20 clear summertime

Use this command to clear the daylight savings time configuration.

clear summertime

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the daylight savings time configuration:

```
Matrix> clear summertime
```

3.2.2.21 set console baud

Use this command to set the console port baud rate.

set console baud *rate*

Syntax Description

rate	Specifies the console baud rate. Valid values are **38400**, **19200**, **9600**, **4800**, and **2400**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Alternative (v3.00.xx and previous)

set system baud *rate*

Example

This example shows how to set the console port baud rate to 19200:

```
Matrix>set console baud 19200
```

3.2.2.22 show ip address

Use this command to display the local host port IP address, system mask and default gateway.

show ip address

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the system IP address, the system mask and the default gateway:

```
Matrix>show ip address
 System IP    - 10.1.10.1
 System Mask  - 255.255.128.0
 Default Gateway - 0.0.0.0
```


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3.2.2.23 set ip address

Use this command to set the system IP address, subnet mask and default gateway.

set ip address *ip_address* [mask *ip_mask*] [gateway *ip_gateway*]

Syntax Description

ip_address	Specifies the IP address to set for the device.
mask ip_mask	(Optional) Specifies the IP mask of the local host.
gateway ip_gateway	(Optional) Specifies the default gateway of the local host.

Command Defaults

If not specified, *ip_mask* and *ip_gateway* will not be changed.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the host port IP address to 10.1.10.1 with a mask of 255.255.128.0 and a default gateway of 10.1.0.1:

```
Matrix>set ip address 10.1.10.1 mask 255.255.128.0 gateway 10.1.10.1
```


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3.2.3 Downloading a Firmware Image

You can upgrade the operational firmware in the Matrix E1 without physically opening the device or being in the same location. The software storage sector in the flash memory of the device is reprogrammed, allowing you to easily download firmware feature enhancements and problem fixes to the device from a local or remote location.

Firmware can be downloaded to the device in two ways:

- Via TFTP download. This is the recommended firmware upgrade method. It uses a TFTP server connected to the network and downloads the firmware using the TFTP protocol. A TFTP download is much faster than a serial download, requiring only a few seconds, and can be used to upgrade a device that is not physically in the area. For details, refer to Section 3.2.3.2.
- Via the serial (console) port. This procedure is an out-of-band operation that copies the firmware through the serial port to the device. This operation takes approximately three minutes and requires minimal configuration. Serial console download has been successfully tested with the following applications:
  - SecureCRT Version 3.3.2,
  - HyperTerminal Copyright 1999

    Any other terminal applications may work but are not explicitly supported. For details, refer to Section 3.2.3.1.

3.2.3.1 Downloading via the Serial Port

A serial download is the easiest method to upgrade the device firmware, requiring the least amount of equipment and configuration.

To download device firmware via the serial (console) port, proceed as follows:

1. With the console port connected, reset the device by powering the device off and then on.
2. As the device is booting up, a message displays indicating POST Version, followed by “Starting application”. At this point, reset the device again.
3. When the Power On Self Test (POST) begins, press ESC to bypass it. The following message displays:

```
(D)ownload System Image or (S)tart Application: [S]
```

4. Press **D** to download system firmware. The following message displays:

```
Select the Firmware Type to Download (1)Runtime (2)POST [1]:
```


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5. Press **1** to download the agent firmware. The following messages display:

```
(D)ownload System Image or (S)tart Application: [S]
Select the Firmware Type to Download (1)Runtime (2)POST [1]:
Your Selection: Runtime Code
Download code to FlashROM address 0xff200000
Change Baud Rate to 115200 and Press <ENTER> to Download.
```

6. Change your terminal baud rate to **115200** bps and press ENTER.
7. Send the file using the XMODEM protocol from your computer application (the procedure varies depending upon the application used).
8. When the XMODEM procedure finishes, the following messages display:

```
Verifying image in DRAM download buffer 0x01000000... SUCCESS !
Update FlashROM Image at 0xFF200000 ...
Erasing 3 FlashROM Blocks at 0xFF200000 ...
Writing FlashROM Image at 0xFF200000 ... SUCCESS !
Erasing 3 FlashROM Blocks at 0xFF500000 ...
Writing FlashROM Image at 0xFF500000 ... SUCCESS !
Change Baud Rate to 9600 and Press <ENTER>.
```

9. Change your terminal baudrate back to **9600** and press ENTER. The following message displays:

```
(D)ownload another Image or (S)tart Application: [S]
```

10. Press **S** to start the application.

3.2.3.2 Downloading via TFTP

To perform a TFTP download, you must first set the device's IP address (as detailed in Section 3.2.2.23). You then use the **dload** command to enter the IP address of the TFTP server and the name of the image file.

dload

Use this command to download a new firmware image from a TFTP server to the device.

dload *hostname* | *ip-address filename* [**noreboot**]

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Syntax Description

hostname | *ip_address*	Specifies the host name or IP address of the TFTP server from which the new image file will be downloaded.
filename	Specifies the TFTP server path and file name of the new image.
noreboot	(Optional) Specifies that the device will not reboot after completing the download of an image file. The device will continue using the existing firmware image and will store the new image in FLASH memory. The next time the device is reset or powered-up, it will boot from FLASH memory using the new image.

Command Defaults

If **noreboot** is not specified, the device will reboot automatically using the new image.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to download a new firmware image via a TFTP server:

```
Matrix>dload 172.101.50.87 d:\images\xfiles\010000.09

File downloaded successfully.
Updating flashROM image at 0xFF200000 ...
Image update successful.
Updating flashROM image at 0xFF500000 ...
Image update successful.

Restarting system...
Saving persistent data
++++++++++++++++++++++++++++++++++++++++++++++++++

(c)Copyright ENTERASYS Networks, Inc. 2001
Matrix 1H582-51
POST Version 01.00.00

Application image found in Flash memory.
Loading functional image ...
Application image loaded to CPU SDRAM.
Start Application ...

1H582-51
Switch init start...
Switch Budget init...
Initializing hardware...
Switch clear VLAN table...
Initializing databases...

Username:
```


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3.2.4 Configuring Telnet

To review, enable, disable and configure Telnet services to the device when operating in switch mode.

Commands

The commands needed to configure Telnet are listed below and described in the associated section as shown.

- show telnet (Section 3.2.4.1)
- set telnet (Section 3.2.4.2)

3.2.4.1 show telnet

Use this command to display Telnet status and information.

show telnet

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-only.

Example

This example shows how to display Telnet status and information. In this case inbound and outbound service is enabled on the device and maximum number of inbound, outbound and SSH

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Telnet sessions have not been changed from the default value of 4. For details on using the **set telnet** command to change default settings, refer to Section 3.2.4.2:

```
Matrix>show telnet
Inbound telnet is currently enabled on port 23.
Outbound telnet is currently enabled.

Maximum inbound telnet sessions  = 4.
Maximum outbound telnet sessions = 4.
Maximum ssh telnet sessions      = 4.
```

3.2.4.2 set telnet

Use this command to configure Telnet on the device.

set telnet {[**disable** | **enable**] **inbound** | **outbound** | **all**} | **port** *port* | **session** {**inbound** | **outbound** | **ssh**}*session*}

Syntax Description

disable | enable	Disables or enables Telnet services.
inbound | outbound | all	Disables or enables inbound service (the ability to Telnet to this device), outbound service (the ability to Telnet to other devices), or all (both inbound and outbound).
port *port*	Sets the Telnet listening port. Valid values are: • port number **1024** to **65535**, or • **default** (port number 23)
session inbound | **outbound** | **ssh** *session*	Sets the maximum number of inbound sessions (the ability to Telnet to this device), outbound sessions (the ability to Telnet to other devices), or SSH (Secure Shell) sessions. Valid values are **0** to **4**. For more information on configuring SSH, refer to Section 14.3.6.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Examples

This example shows how to disable inbound and outbound Telnet services:

```
Matrix>set telnet disable all
Disconnect all telnet sessions and disable now (y/n)? [n]: y
All telnet sessions have been terminated, telnet is now disabled.
```

This example shows how to set the maximum number of outbound Telnet sessions to 3

```
Matrix>set telnet session outbound 3
```

This example shows how to reset the Telnet port to 23:

```
Matrix>set telnet port default
```


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3.2.5 Managing Switch Configuration Files

Purpose

To view, manage, and execute configuration files when operating in switch mode.

Commands

The commands needed to view, manage, and execute switch configuration files are listed below and described in the associated section as shown.

- dir (Section 3.2.5.1)
- show config (Section 3.2.5.2)
- configure (Section 3.2.5.3)
- summaryconfig (Section 3.2.5.4)
- copy (Section 3.2.5.5)
- set system bootconfig (Section 3.2.5.6)
- delete (Section 3.2.5.7)

3.2.5.1 dir

Use this command to display CLI configuration files stored in NVRAM.

dir [**all**]

Syntax Description

all	(Optional) Displays all files in the NVDRIVE: file system.

Command Type

Switch command.

Command Mode

Read-only.

Command Defaults

If **all** is not specified, only configuration files stored in the NVDRIVE: file system will be displayed.

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Example

This example shows how to display contents of the NVDRIVE: file directory:

```
Matrix>dir
Filename     Filesize
 ------------------------
CLITXT.CFG   480
```

3.2.5.2 show config

Use this command to display the contents of the CLI text configuration file.

show config [*filename* [**all** | **system**] [*facility*]]

Syntax Description

filename	(Optional) Displays a specific file. The *filename* extension must be .cfg
all	(Optional) Displays the entire configuration file.
system	(Optional) Displays only the CLI commands from the configuration file.
facility	(Optional) Displays the configuration for a specific facility. For example, **show config spantree** would display only the non-default Spanning Tree configuration.

Command Type

Switch command.

Command Mode

Read-only.

Command Defaults

- If *filename* is not specified, the current CLI set commands will be regenerated and spooled to the console.
- If **all** or **system** are not specified with a *filename*, the entire configuration file will be displayed.
- If a *facility* is not specified, configurations for all known facilities will be displayed.

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Examples

This example shows how to display system information in the clitxt.cfg file:

```
Matrix>show config clitxt.cfg system
                          clitxt.cfg
set vlan 30 create
set vlan 40 create
set vlan 30 enable
set vlan name 30 blue
set vlan egress 30 fe.0.7 untagged
set vlan classification enable
set vlan classification 30 802.3-SAP 0X0020 create
set vlan classification 30 802.3-SAP 0X0020 enable
set port vlan fe.0.4-fe.0.7 30
set port broadcast fe.0.10-fe.0.15 enable
set port ingress filter fe.0.3 enable
show spantree stats
```


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This example shows how to regenerate the current set commands:

```
Matrix>show config
Creating CLI device configuration Set commands!

!
! cdp
!
! community
!
! dns
!
! garp
!
! gvrp
!
! history
!
! host vlan
!
! igmp
 set igmp enable
!
! ip
 set ip address  10.2.242.112 mask 255.255.240.0 gateway
10.2.240.1
--More--
```

3.2.5.3 configure

Use this command to execute a previously downloaded configuration file, schedule a configuration update for a later time, cancel a configuration update, or display scheduled configuration update information.

configure {[*filename* [**append**] [**at** *time*] [**in** *time*] [**reason** *reason*] | **show** | **cancel**}

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Syntax Description

filename	Specifies the name of the configuration file to execute.
append	(Optional) Executes the configuration as an appendage (update) to the current configuration.
at *time*	(Optional) Schedules a configuration update at a specific time using a 24-hour system (hh:mm).
in *time*	(Optional) Schedules a configuration update after a specific time in hours and minutes using a 24-hour system (hh:mm).
reason *reason*	(Optional) Specifies a reason (text string) for updating the configuration.
show	Displays information about a scheduled configuration update.
cancel	Cancels a scheduled configuration update.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If **append** is not specified, the current running configuration will be replaced with the contents of the configuration file.
- If an **at** *time* or **in** *time* are not specified, the configuration will be updated immediately.
- If a **reason** is not specified, none will be applied.

Examples

This example shows how to execute clitxt.txt and update NVRAM to reflect the new configuration:

```
Matrix>configure clitxt.txt
```


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This example shows how to schedule an NVRAM update by appending the clitxt.txt configuration file in two hours:

```
Matrix>configure clitxt.txt append in 02:00
```

3.2.5.4 summaryconfig

Use this command to display the Matrix E1 non-default configuration to the console, or, by entering the **file** keyword, write it to the swfile.cfg file.

summaryconfig [**file**]

Syntax Description

file	(Optional) Writes the configuration to the scfile.cfg. This file can then be displayed using the **show config** command, or uploaded to a file or a server using the **copy** command.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If **file** is not specified, the configuration will be displayed to the console.

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Example

This example shows a portion of the output created by the **summaryconfig** command:

```
>show rad
RAD is currently enabled.
>

 >show radius
RADIUS status:          Disabled.
RADIUS retries:         3.
RADIUS timeout:         20 seconds

RADIUS Server           Status          Auth-Port
-------------           ------          ---------
0.0.0.0                 Primary         0
0.0.0.0                 Secondary       0

 RADIUS last-resort-action      Status
--------------------------      ------
Local                           Challenge
Remote                          Challenge
>
>show snmp
SNMP is currently enabled.
>
>show system
Power Supply Status
-----------------------
PS1 - Operational

PS2 - Non-Operational

System Baud : 9600                System Timeout : 5 minutes.

System Lockout Time : 15 minutes.

System Uptime : 0 days, 23 hours, 26 minutes, 54 seconds

System Name              System Location          System Contact
------------------------ ------------------------ --------------
 sysName                  sysLocation              sysContact
>
>show telnet
Telnet is currently enabled.
```


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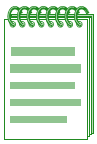
3.2.5.5 copy

Use this command to upload or download a configuration file.

copy *source destination*

The options for using this syntax are:

- **copy** *filename1 filename2*
- **copy** {*filename* **device-config**} **tftp:**[[[//*url*/*directory*/*filename*]
- **copy tftp:**[[[//*url*]/*directory*]/*filename*] {*filename* | **device-config**} [**append**]



NOTES: The switch IP address, dip switch, and event log settings will not be affected by the download of a configuration file from another Matrix E1 switch.

If the file being downloaded is a text configuration file, then commands from the file will be set on the receiving device, including IP addresses.

Syntax Description

source	Specifies the source file to copy. Options are **device-config**, a *filename*, or the URL of a TFTP server. (See individual descriptions below.)
destination	Specifies the destination where the file will be copied. Options are **device-config**, a *filename*, or the URL of a TFTP server. (See individual descriptions below.)
filename	Specifies the source file to copy or the destination where the file will be copied to the NVDRIVE: file system.
device-config	Creates and uploads a text configuration file, or specifies the destination for a text configuration file.
tftp:[[[//url/ directory/ *filename*	Specifies the TFTP server IP address and directory where the source or destination file is located, and the name of the file being copied or overwritten.
append	(Optional) Adds the CLI commands from the specified file without resetting the device. This option is only valid when the **device-config** keyword is used.

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NOTES: There is an important distinction between specifying a *filename* and using the **device-config** option.

When uploading, the *filename* specified in the *destination* pathname (the server) is created.

When downloading, if the **device-config** keyword is entered, then the *filename* specified in the *source* pathname is downloaded and executed. This file will not be saved in NVRAM. If a *filename* is entered instead of **device-config**, then the specified source file is downloaded and saved in NVRAM with the destination *filename*. This file will not be processed until it is executed with the **configure** command described in Section 3.2.5.3.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If **append** is not specified, the **device-config** file will be replaced.

Examples

This example shows how to copy the clitxt.txt file to clitxt1.txt:

```
Matrix>copy clitxt.txt clitxt1.txt
```

This example shows how to copy (upload) a configuration text file to the network server:

```
Matrix>copy clitxt.txt tftp://10.1.128.60/config/clitxt.txt
```

This example shows how to upload the device configuration to the network server. The uploaded file will not be saved in NVRAM:

```
Matrix>copy device-config tftp://10.1.129.3/config/clitxt.txt
```

This example shows how to copy (download) a configuration text file from the network server to the Matrix E1 file system. This text file can then be executed using the **configure** command:

```
Matrix>copy tftp://10.1.129.3/config/clitxt.txt clitxt.txt
```


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This example shows how to download and execute the clitxt.txt file. This command will reset the device:

```
Matrix>copy tftp://10.1.129.3/config/clitxt.txt device-config
```

This example shows how to download and execute the cliappend.txt file. This command will not reset the device:

```
Matrix>copy tftp://10.1.29.3/config/cliappend.txt device-config append
```

3.2.5.6 set system bootconfig

Use this command to select the configuration file the device will load at startup.

set system bootconfig {**flash** | **network** *file-location*}

Syntax Description

flash	Loads the flash configuration file.
network *file-location*	Specifies a network file location from which to load the configuration file.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the boot configuration file to flash:

```
Matrix>set system bootconfig flash
```


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3.2.5.7 delete

Use this command to remove a configuration file from the Matrix E1 system.

delete *filename*

Syntax Description

filename	Specifies the configuration file to remove.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to delete the clitxt1.cfg configuration file:

```
Matrix>delete clitxt1.cfg
```


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3.2.6 Configuring Enterasys and Cisco Discovery Protocols

Purpose

To enable and configure the Enterasys (CDP) and Cisco discovery protocols. These protocols are used to discover network topology. When enabled, they allow Enterasys and Cisco devices to send periodic PDUs about themselves to neighboring devices. The Cisco Discovery Protocol is also used to manage the Cisco module of the Convergence End Points (CEP) IP phone detection function described in Section 11.2.6.

Commands

The commands needed to configure the Enterasys and Cisco discovery protocols are listed below and described in the associated section as shown.

- show cdp (Section 3.2.6.1)
- set cdp (Section 3.2.6.2)
- set cdp interval (Section 3.2.6.3)
- show ciscodp (Section 3.2.6.4)
- set ciscodp status (Section 3.2.6.5)
- set ciscodp timer (Section 3.2.6.6)
- set ciscodp holdtime (Section 3.2.6.7)
- set ciscodp populatecdp (Section 3.2.6.8)
- show port ciscodp info (Section 3.2.6.9)
- show port ciscodp neighborinfo (Section 3.2.6.10)
- set port ciscodp status (Section 3.2.6.11)
- set port ciscodp trust-ext (Section 3.2.6.12)
- set port ciscodp cos-ext (Section 3.2.6.13)
- set port ciscodp vvid (Section 3.2.6.14)

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3.2.6.1 show cdp

Use this command to display the status of the Enterasys (CDP) Discovery Protocol and message interval on one or more ports.

show cdp [*port-string*]

Syntax Description

port-string	(Optional) Displays Enterasys Discovery Protocol information for specific port(s). For a detailed description of possible port-string values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, the CDP state for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display Enterasys Discovery Protocol for Fast Ethernet front panel ports 3 through 11:

```
Matrix>show cdp fe.0.3-11
 CDP Version :  6
 Global CDP State :  auto
 Global Hold Time :  180

 Port       State     Port       State     Port       State
 ------------------------------------------------------------
  fe.0.3    auto      fe.0.4     auto       fe.0.5    auto
  fe.0.6    auto      fe.0.7     auto       fe.0.8    auto
  fe.0.9    auto      fe.0.10    auto       fe.0.11   auto
```

Table 3-6 provides an explanation of the command output.

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Table 3-6 show cdp Output Details

Output	What It Displays...
CDP Version	Current Enterasys Discovery Protocol version number.
Global CDP State	Whether Enterasys Discovery Protocol is globally auto-enabled, enabled or disabled.
Global Hold Time	Transmit frequency (in seconds) of Enterasys Discovery Protocol messages. For details on using the **set cdp interval** command to change the default value of **60**, refer to Section 3.2.6.2.
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
State	Whether Enterasys Discovery Protocol is enabled, disabled or in auto mode on this port. For details on using the **set cdp** command to change the default setting of **auto**, refer to Section 3.2.6.2.

3.2.6.2 set cdp

Use this command to enable or disable the Enterasys Discovery Protocol on one or more ports.

set cdp {**auto** | **disable** | **enable**} [*port-string*]

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Syntax Description

auto	Auto-enables the Enterasys Discovery Protocol on the device or on specified port(s). In auto-mode, which is the default mode for all ports, a port automatically becomes CDP-enabled upon receiving its first CDP message on any port. **NOTE:** Auto mode will only be operational for specific ports if the global CDP state has been set to auto as well. If the global state is enabled, then all ports in auto mode will run CDP. If the global state is disabled, then all ports in auto mode will not run CDP.
disable	Disables the Enterasys Discovery Protocol on the device or on specified port(s).
enable	Enables the Enterasys Discovery Protocol on the device or on specified port(s).
port-string	(Optional) Enables or disables Enterasys Discovery Protocol for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, the CDP state will be set globally on the device.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to globally enable Enterasys Discovery Protocol:

```
Matrix>set cdp enable
```

This example shows how to enable Enterasys Discovery Protocol for Fast Ethernet expansion module 2, port 1:

```
Matrix>set cdp enable fe.2.1
```


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This example shows how to disable Enterasys Discovery Protocol for Fast Ethernet expansion module 2, port 1:

```
Matrix>set cdp disable fe.2.1
```

3.2.6.3 set cdp interval

Use this command to set the message interval frequency of the Enterasys Discovery Protocol.

set cdp interval *frequency*

Syntax Description

frequency	Specifies the transmit frequency of Enterasys Discovery Protocol messages in seconds.Valid values are from **5** to **900**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the CDP interval frequency to 15 seconds:

```
Matrix>set cdp interval 15
```

3.2.6.4 show ciscodp

Use this command to display global Cisco Discovery Protocol information.

show ciscodp

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display Cisco Discovery Protocol information. In this case, defaults have not been changed:

```
Matrix>show ciscodp
CiscoDP : Disabled
Timer : 60
Holdtime (TTL) : 180
Platform : Matrix 1G587-09
Version : 03.02.00
Device ID : 0123456789
PopulateCDP : Disabled
```

Table 3-7 provides an explanation of the command output.

Table 3-7 show ciscodp Output Details

Output	What It Displays...
CiscoDP	Whether Cisco Discovery Protocol is disabled or enabled. Default setting of disabled can be changed with the **set ciscodp status** command as described in Section 3.2.6.5.
Timer	Number of seconds between Cisco Discovery Protocol PDU transmissions. Default value of **60** can be changed with the **set ciscodp timer** command as described in Section 3.2.6.6.
Holdtime (TTL)	Number of seconds neighboring devices will hold PDU transmissions from the sending device. Default value of **180** can be changed with the **set ciscodp holdtime** command as described in Section 3.2.6.7.
Platform	Description of the sending device.
Version	Sending device's firmware version.

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Table 3-7 show ciscodp Output Details (Continued)

Output	What It Displays...
Device ID	Sending device's serial number.
PopulateCDP	Whether the populate Enterasys (CDP) discovery protocol function is enabled or disabled. Default setting of disabled can be changed with the **set ciscodp populatecdp** command as described in Section 3.2.6.8.

3.2.6.5 set ciscodp status

Use this command to enable or disable Cisco Discovery Protocol on the device.

set ciscodp status {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables Cisco Discovery Protocol.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Cisco Discovery Protocol on the device:

```
Matrix>set ciscodp status enable
```

3.2.6.6 set ciscodp timer

Use this command to set the number of seconds between Cisco Discovery Protocol PDU transmissions.

set ciscodp timer *time*

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Syntax Description

time	Specifies the number of seconds between PDU transmissions. Valid values are **5 - 254**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the Cisco Discovery Protocol timer to 120 seconds:

```
Matrix>set ciscodp timer 120
```

3.2.6.7 set ciscodp holdtime

Use this command to set the time to live (TTL) for Cisco Discovery Protocol PDUs. This is the amount of time (in seconds) neighboring devices will hold PDU transmissions from the sending device.

set ciscodp holdtime *time*

Syntax Description

time	Specifies the time to live for PDUs. Valid values are 10 - **255**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the Cisco Discovery Protocol hold time to 180 seconds:

```
Matrix>set ciscodp holdtime 180
```

3.2.6.8 set ciscodp populatecdp

Use this command to populate the Enterasys (CDP) Discovery Protocol MIB with Cisco information. When enabled, this function allows Cisco devices to appear in the Enterasys Discovery Protocol (CDP) MIB along with Enterasys devices.

set ciscodp populatecdp {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the CDP populate function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the CDP populate function:

```
Matrix>set ciscodp populatecdp enable
```

3.2.6.9 show port ciscodp info

Use this command to display summary information about the Cisco Discovery Protocol on one or more ports.

show port ciscodp info [*port-string*]

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Syntax Description

port-string	(Optional) Displays information about specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, Cisco DP information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display Cisco Discovery Protocol information for all Gigabit Ethernet ports:

```
Matrix>show port ciscodp info ge.*.*
Port     State    VVID   #Neigh   PDU-TX   PDU-RX  CosExt   TrustExt
-------------------------------------------------------------------
ge.0.1   Disabled none      0        0        0   undef    undef
ge.0.2   Disabled none      0        0        0   undef    undef
ge.0.3   Disabled none      0        0        0   undef    undef
ge.0.4   Disabled none      0        0        0   undef    undef
ge.0.5   Disabled none      0        0        0   undef    undef
ge.0.6   Disabled none      0        0        0   undef    undef
```

Table 3-8 provides an explanation of the command output.

Table 3-8 show port ciscodp info Output Details

Output	What It Displays...
Port	Port designation.
State	Whether Cisco DP is enabled or disabled on this port. Default state of disabled can be changed using the **set port ciscodp status** command (Section 3.2.6.11).

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Table 3-8 show port ciscodp info Output Details (Continued)

Output	What It Displays...
VVID	Whether a Voice VLAN ID has been set on this port. Default of none can changed using the **set port ciscodp vvid** command (Section 3.2.6.14).
#Neigh	Number of neighboring Cisco devices detected on this port.
PDU-TX	Number of Cisco DP PDUs transmitted on this port.
PDU-RX	Number of Cisco DP PDUs received on this port.
CosExt	Whether or not a Cisco DP Class of Service has been defined for this port. Default of undefined can be changed using the **set port ciscodp cos-ext** command (Section 3.2.6.13).
TrustExt	Whether or not a trusted status has been defined for this port. Default of undefined can be changed using the **set port ciscodp trust-ext** command (Section 3.2.6.12).

3.2.6.10 show port ciscodp neighborinfo

Use this command to display information about neighboring Cisco devices on one or more ports.

show port ciscodp neighborinfo [**details**] [*port-string*]

Syntax Description

details	(Optional) Displays detailed information.
port-string	(Optional) Displays information about specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

- If **details** is not specified, summary information will be displayed.
- If *port-string* is not specified, Cisco DP information will be displayed for all ports.

Command Type

Switch command.

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Command Mode

Read-Only.

Examples

This example shows how to display a summary of information about neighboring Cisco devices detected on Matrix port ge.0.4. In this case, a device is connected at the neighboring device's module 2, port 1 link:

```
Matrix>show port ciscodp neighborinfo ge.0.4
          Sysname          Platform            Port ID
 ------------------------------------------------------------------
ge.0.4  ggismysysname     WS-C6509            2/1
```

3.2.6.11 set port ciscodp status

Use this command to set the status of the Cisco Discovery Protocol on one or more ports.

set port ciscodp status *port-string* {**disable** | **enable**}

NOTE: The Cisco Discovery Protocol must be globally enabled using the **set ciscodp status** command as described in Section 3.2.6.5 before operational status can be set on individual ports.

Syntax Description

port-string	Specifies the port(s) on which status will be set. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
disable | **enable**	Sets the port status as: • disabled - will not transmit or detect neighbors • enabled - will transmit and will detect neighbors

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to enable the Cisco DP function on port ge.0.5:

```
Matrix>set port ciscodp ge.0.5 enable
```

3.2.6.12 set port ciscodp trust-ext

Use this command to set the trusted status of one or more switch ports connected to a Cisco IP phone. Note the following points describing how the Cisco DP trust settings work.

- A Cisco DP port trust status of trusted or untrusted is only meaningful when a Cisco IP phone is connected to a switch port and a PC or other device is connected to the back of the Cisco IP phone.
- A Cisco DP port state of trusted or untrusted only affects tagged traffic transmitted by the device connected to the Cisco IP phone. Untagged traffic transmitted by the device connected to the Cisco IP phone is unaffected by this setting.
- If the switch port is configured to a Cisco DP trust state of **trusted** (via this command, **set port ciscodp trust-ext**), this setting is communicated to the Cisco IP phone instructing it to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking.
- If the switch port is configured to a Cisco DP trust state of **untrusted**, this setting is communicated to the Cisco IP phone instructing it to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value specified by the command **set port ciscodp cos-ext**.
- There is a one-to-one correlation between the value set by the **set port ciscodp cos-ext** command (Section 3.2.6.13) and the 802.1p value assigned to ingressed traffic by the Cisco IP phone. A classify-value of 0 equates to an 802.1p priority of 0 which is given lower priority than an 802.1p priority of 7. Therefore, a classify value of 7 is given the highest priority.

set port ciscodp trust-ext *port-string* {**trusted** | **untrusted** | **undefined**}

Syntax Description

port-string	Specifies the port(s) on which to set trusted status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
trusted	Tell the Cisco IP phone to allow the device connected to it to transmit traffic containing any CoS or Layer 2 802.1p marking.

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untrusted	Tell the Cisco IP phone to overwrite the 802.1p tag of traffic transmitted by the device connected to it to 0, by default, or to the value configured with the **set port ciscodp cos-ext** command (Section 3.2.6.13).
undefined	No trust state setting is communicated to the Cisco IP phone.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to designate port ge.0.5 as untrusted:

```
Matrix>set port ciscodp trust-ext ge.0.5 untrusted
```

3.2.6.13 set port ciscodp cos-ext

Use this command to set the CoS priority value which the Cisco IP phone should use to overwrite the 802.1p tag of traffic transmitted by the device connected to the IP phone when the switch port is configured to a Cisco DP trust state of untrusted (refer to the **set port ciscodp trust-ext** command, Section 3.2.6.13). If a CoS priority value is not set with this command, by default the Cisco IP phone will overwrite the 802.1p tag value with 0.

set port ciscodp cos-ext *port-string* {*classify-value* | **undefined**}

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Syntax Description

port-string	Specifies the port(s) on which to set a CoS value. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
classify-value	Assigns a Class of Service to untrusted traffic. Valid values are **0** - **7**, with 0 given the lowest priority. There is a one-to-one correlation between this *classify-value* and the 802.1p value assigned to ingressed traffic by the Cisco IP phone. A *classify-value* of 0 equates to an 802.1p priority of 0, which is given lower priority than an 802.1p priority of 7. Therefore, a *classify-value* of 7 is given the highest priority.
undefined	No CoS value is communicated to the Cisco IP phone.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign priority 7 to untrusted traffic from port ge.0.5:

```
Matrix>set port ciscodp cos-ext ge.0.5 7
```

3.2.6.14 set port ciscodp vvid

Use this command to set the voice VLAN ID for a Cisco DP port. This instructs the IP phone device connected to this port how to tag voice traffic.

set port ciscodp vvid *port-string* {*vlan-id* | **none** | **dot1p** | **untagged**}

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Syntax Description

port-string	Specifies the port(s) on which tagging will be set. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
vlan-id	Instructs an attached Cisco IP phone to transmit to a specific VLAN. Valid values are **1** - **4094**. For information on creating and configuring VLANs, refer to Chapter 7.
none	Specifies that no VVID will be included in CiscoDP PDUs transmitted out this port.
dot1p	Instructs an attached Cisco IP phone to transmit 802.1p priority tagged traffic.
untagged	Instructs an attached Cisco IP phone to transmit untagged traffic.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure port ge.0.5 to transmit voice traffic to VLAN 2:

```
Matrix>set port ciscodp vvid ge.0.5 2
```


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3.2.7 Pausing, Clearing and Closing the CLI

Purpose

To pause or clear the CLI screen or to close your CLI session.

Commands

The commands used to pause, clear and close the CLI session are listed below and described in the associated sections as shown.

- wait (Section 3.2.7.1)
- cls (Section 3.2.7.2)
- exit (Section 3.2.7.3)

3.2.7.1 wait

Use this command to pause the CLI for a specified number of seconds before executing the next command.

wait *seconds*

Syntax Description

seconds	Specifies the number of seconds for the CLI to pause before executing the next command

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to pause the CLI for 10 seconds:

```
Matrix>wait 10
 Wait for 10 seconds . . .
```


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3.2.7.2 cls (clear screen)

Use this command to clear the screen for the current CLI session.

cls

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to clear the CLI screen:

```
Matrix>cls
```

3.2.7.3 exit

Use this command to leave a CLI session when operating in switch mode.

exit

NOTE: Device timeout occurs after five minutes of user inactivity, automatically closing your CLI session.

When operating in router mode, the **exit** command jumps to a lower configuration level. For details on enabling router configuration modes, refer to Section 3.3.3.

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to exit a CLI session:

```
Matrix>exit
```


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3.2.8 Resetting the Device

Purpose

To reset the device without losing any user-defined switch and router configuration parameters, or to clear NVRAM (user-defined) config settings.

Commands

Commands to reset the device are listed below and described in the associated section as shown.

- show reset (Section 3.2.8.1)
- reset (Section 3.2.8.2)
- reset at (Section 3.2.8.3)
- reset in (Section 3.2.8.4)
- clear config (Section 3.2.8.5)

3.2.8.1 show reset

Use this command to display information about scheduled device resets.

show reset

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This command shows how to display reset information

```
Matrix>show reset

Reset scheduled for Fri Jan 21 2004, 23:00:00 (in 3 days 12 hours 56 minutes 57
seconds).
Reset reason: Software upgrade
```

3.2.8.2 reset

Use this command to reset the device immediately, cancel, or display information about a scheduled reset.

reset [**system** [**cancel**]] [**show**]

Syntax Description

system	(Optional) Resets the system.
cancel	(Optional) Cancels a reset scheduled using the **reset at** command as described in Section 3.2.8.3, or the **reset in** command as described in Section 3.2.8.4.
show	(Optional) Displays information about a scheduled reset.

Command Defaults

If no parameters are specified, the system will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to reset the system immediately:

```
Matrix>reset
This command will reset the device.
Do you want to continue (y/n) [n]? y

 Resetting device...
```


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This example shows how to cancel a scheduled system reset:

```
Matrix>reset cancel

Reset cancelled.
```

3.2.8.3 reset at

Use this command to schedule a system reset at a specific future time. This feature is useful for loading a new boot image.

reset at *hh:mm* [*mm/dd*] [**reason** *reason*]

Syntax Description

hh:mm	Schedules the hour and minute of the reset (using the 24-hour system).
mm/dd	(Optional) Schedules the month and day of the reset.
reason *reason*	(Optional) Specifies a reason for the reset. A string containing a space in the text must be enclosed in quotes as shown in the example below.

Command Defaults

- If month and day are not specified, the reset will be scheduled for the first occurrence of the specified time.
- If a *reason* is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to schedule a reset at 8 p.m. on October 12:

```
Matrix>reset at 20:00 10/12
```


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This example shows how to schedule a reset at a specific future time and include a reason for the reset:

```
Matrix>reset at 20:00 10/12 reason “software upgrade to 6.1”
```

3.2.8.4 reset in

Use this command to schedule a system reset after a specific time. This feature is useful for loading a new boot image.

reset in *hh:mm* [**reason** *reason*]

Syntax Description

hh:mm	Specifies the number of hours and minutes into the future to perform a reset.
reason *reason*	(Optional) Specifies a reason for the reset. A string containing a space in the text must be enclosed in quotes.

Command Defaults

If a **reason** is not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to schedule a device reset in 5 hours and 20 minutes:

```
Matrix>reset in 5:20
```

3.2.8.5 clear config

Use this command to clear the user-defined switch configuration parameters stored in NVRAM. This resets the device back to its factory default settings, while giving you the option to maintain the system IP address and SSH (Secure Shell) host keys. For a list of default settings for this device, refer to Section 3.1.1.

clear config

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NOTE: Clear config will not clear user account settings, such as lockout attempts, login names and passwords, unless executed by a super user (admin).

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the device's NVRAM configuration parameters without clearing the IP address or SSH keys:

```
Matrix>clear config
This command will clear NVRAM.
Do you want to continue (y/n) [n]? y
Keep the IP setting (y/n) [n]? y
Keep the SSH host keys (y/n) [n]? y
Clearing NVRAM..
```


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3.3 PREPARING THE DEVICE FOR ROUTER MODE

Important Notice

Startup and general configuration of the Matrix E1 must occur when the device is in switch mode. For details on how to start the device and configure general platform settings, refer to Section 3.1 and Section 3.2. Once startup and general device settings are complete, IP configuration and other router-specific commands can be executed when the device is in router mode. For details on how to enable router mode from switch mode, refer to Table 3-10 in Section 3.3.3.

3.3.1 Pre-Routing Configuration Tasks

The following pre-routing tasks, as detailed in Section 3.1 and Section 3.2, must be performed while the device is in switch mode.

- Starting up the CLI. (Section 3.1.6)
- Setting user accounts and passwords. (Section 3.2.1)
- Configuring basic platform settings, such as host name, system clock, and terminal display settings. (Section 3.2.2)
- Setting the system IP address. (Section 3.2.2.23)
- File management tasks, including uploading or downloading flash or text configuration files, and displaying directory and file contents. (Section 3.2.5)
- Configuring two or more VLANs that will be dedicated to IP routing. (Section 3.3.2)

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3.3.2 Configuring VLANs for IP Routing

Before you can use the Matrix E1 device for IP routing, you must dedicate two or more VLANs as IP routing uplinks. To do this, you must

1. Disable Spanning Tree on the ports to be dedicated as routing uplinks.
2. Create new VLANs from these dedicated ports.
3. Disable GVRP on the dedicated ports.
4. In router mode, assign IP addresses to the new VLANs, enable them for IP routing, and save the routing configuration to NVRAM.

The commands needed for this process are listed in Table 3-9, and are described in the associated sections as shown.

Table 3-9 Command Set for Configuring VLANs for IP Routing

	To do this task...	Type this command...	In this mode...	For details, see...
Step 1	Disable Spanning Tree on the dedicated routing port.	**set spantree portadmin** *port-string* **disable**	Switch: (**Matrix**>)	Section 6.2.2.2
Step 2	Create a new IEEE 802.1Q VLAN or enable an existing VLAN on the dedicated routing port.	**set vlan** {**create** | **enable**} *vlan_id*	Switch: (**Matrix**>)	Section 7.3.2.1
Step 3	Set the port's VLAN identifier (*vlan_id*). Enter **y** when prompted to add the port to the VLAN's untagged egress list and remove it from all other VLANs' untagged egress lists.	**set port vlan** *port-string vlan_id*	Switch: (**Matrix**>)	Section 7.3.3.2

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Table 3-9 Command Set for Configuring VLANs for IP Routing (Continued)

	To do this task...	Type this command...	In this mode...	For details, see...
Step 4	Disable GVRP on the dedicated routing port.	**set gvrp disable** *port-string*	Switch: (**Matrix>**)	Section 7.3.8.3
Step 5	Repeat steps 1 through 4 to create additional VLAN(s).			
Step 6	Enable router mode.	**router**	Switch: (**Matrix>**)	Section 3.3.3
Step 7	Enable global router configuration mode.	**configure terminal**	Router: **Matrix>Router#**	Section 3.3.3
Step 8	Enable interface configuration mode.	**interface** *vlan_id*	Router: **Matrix> Router(config)#**	Section 12.2.1.2
Step 9	Assign an IP address to the VLAN.	**ip address** {*ip_address ip_mask*}	Router: **Matrix> Router(config-if (Vlan <vlan_id>))#**	Section 12.2.1.4
Step 10	Enable the VLAN for IP routing.	**no shutdown**	Router: **Matrix> Router(config-if (Vlan 1))#**	Section 12.2.1.5
Step 11	Repeat steps 6 through 10 to configure additional VLAN(s) for IP routing.			
Step 12	Save the routing configuration to NVRAM.	**write file filename** *config_file*	Router: **Matrix>Router#**	Section 12.2.2.2

Example

The example in Figure 3-7 shows how to configure two VLANs for IP routing. VLAN 10 is set on Fast Ethernet front panel port 1 with an IP address of 182.127.63.1, and VLAN 20 is set on Fast Ethernet front panel port 2 with an IP address of 182.127.62.1. The configuration is then saved to NVRAM in file called startup.cfg.

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Figure 3-7 Configuring Two VLANs for IP Routing

```
Matrix>set spantree portadmin fe.0.1 disable
Matrix>set vlan create 10
Matrix>set port vlan fe.0.1 10
The PVID is used to classify untagged frames as they ingress into a given port.
Would you like to add the selected port(s) to this vlan's untagged egress list
and remove them from all other vlans untagged egress list(y/n) [n]?
NOTE: choosing 'y' will not remove the port(s) from previously configured
tagged egress lists. y

Matrix>clear vlan egress 10 fe.0.1
Matrix>
Matrix>set vlan egress 10 fe.0.1 untagged
Matrix>set gvrp disable fe.0.1
Matrix>set spantree portadmin fe.0.2 disable
Matrix>set vlan create 20
Matrix>set port vlan fe.0.2 20
The PVID is used to classify untagged frames as they ingress into a given port.
Would you like to add the selected port(s) to this vlan's untagged egress list
and remove them from all other vlans untagged egress list(y/n) [n]?
NOTE: choosing 'y' will not remove the port(s) from previously
configured tagged egress lists. y

Matrix>clear vlan egress 20 fe.0.2
Matrix>
Matrix>set vlan egress 20 fe.0.2 untagged
Matrix>set gvrp disable fe.0.2

Matrix>router
 Entering Router mode.
Matrix>Router#configure terminal
 Enter configuration commands:
Matrix>Router(config)#interface vlan 10
Matrix>Router(config-if(Vlan 10))#ip address 182.127.63.1 255.255.255.0
Matrix>Router(config-if(Vlan 10))#no shutdown
Matrix>Router(config-if(Vlan 10))#exit
Matrix>Router(config)#interface vlan 20
Matrix>Router(config-if(Vlan 20))#ip address 182.127.62.1 255.255.255.0
Matrix>Router(config-if(Vlan 20))#no shutdown
Matrix>Router(config-if(Vlan 20))#exit
Matrix>Router(config)#exit
Matrix>Router#write file filename startup.cfg
Saving information to startup.cfg...done
Matrix>Router#
```


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3.3.3 Enabling Router Configuration Modes

The Matrix E1 CLI provides different modes of router operation for issuing a subset of commands from each mode. Table 3-10 describes these modes of operation.

NOTE: The command prompts used in examples throughout this guide show a system where VLAN 1 has been configured for routing. The prompt changes depending on your current configuration mode, and the interface types and numbers configured for routing on your system.

Table 3-10 Router CLI Configuration Modes

Use this mode...	To...	Access method...	Prompt...
Privileged EXEC Mode	• Set system operating parameters • Show configuration parameters • Save/copy configurations	Type **`router`** from switch mode.	**Matrix>Router#**
Global Configuration Mode	Set system-wide parameters.	Type **`configure terminal`** from Privileged EXEC mode.	**Matrix>Router(config)#**
Interface Configuration Mode	Configure router interfaces.	Type **`interface`** and the interface's *vlan_id* from Global Configuration mode.	**Matrix>Router (config-if(Vlan <vlan_id>))#**
Router Configuration Mode	Set IP protocol parameters.	Type **`router`** and the *protocol name* from Global or Interface Configuration mode.	**Matrix>Router (config-router)#**

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Table 3-10 Router CLI Configuration Modes (Continued)

Use this mode...	To...	Access method...	Prompt...
Key Chain Configuration Mode	Set protocol (RIP) authentication key parameters.	Type **`key chain`** and the key chain *name* from Router (RIP) Configuration mode.	Matrix>Router (config-keychain)#
Key Chain Key Configuration Mode	Configure a specific key within a RIP authentication key chain.	Type **`key`** and the *key-id* from Key Chain Configuration Mode.	Matrix>Router (config-keychain-key)#

NOTE: To jump to a lower configuration mode, type **exit** at the command prompt. To revert back to switch mode, type **exit** from Privileged EXEC router mode.

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4

Port Configuration

This chapter describes the Port Configuration set of commands and how to use them.

4.1 PORT CONFIGURATION SUMMARY

The Matrix E1 has fixed front panel ports at the bottom of the chassis and either one or three optional Ethernet expansion module slot(s) at the top of the chassis.

Matrix E1 fixed front panels provide the following port configurations:

- The 1H582-25 fixed front panel provides 24 RJ45 10/100 Mbps ports.
- The 1H582-51 fixed front panel provides 48 RJ45 10/100 Mbps ports.
- The 1G582-09 fixed front panel provides 6 RJ45 10/100/1000 Mbps ports.
- The 1G587-09 fixed front panel provides 6 Small Form Factor Pluggable (SFP) 1-Gigabit fiber optic ports.

Depending on the Ethernet expansion module(s) installed, each slot provides up to 16 ports via Fast Ethernet RJ45 connectors, or Gigabit Ethernet via fiber optic connections using GBICs.

4.1.1 Port Assignment Scheme

NOTE: Illustrations and most of the examples in this guide are based on the Matrix E1 1H582-51. Configuration and CLI output for the Matrix E1 1H582-25 and 1G58x-09 may be different. Unless noted, procedures and performance features are similar for both models.

The expansion module and fixed front panel port numbering scheme used when configuring Matrix E1 ports is shown in Figure 4-1. Ports 1 through 24, or 1 through 48, are RJ45 10/100 Ethernet connections, and are designated as 0 for being fixed ports on the front panel. In this numbering scheme, front panel port 8 is expressed as 0.8 in the CLI syntax.

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The device's optional expansion module slot(s), numbered 1, or 1,2, and 3, can have one or more ports depending on the module installed. Figure 4-2 shows the Ethernet expansion modules available at the time of this printing, and the location of port 1 on each module. Table 4-1 indicates the port numbering scheme for each expansion module. In this numbering scheme, port 2 on the expansion module in slot 2 would be expressed as 2.2 in the CLI syntax.

For information on how this device's port assignment scheme is expressed in CLI syntax, refer to Section 4.1.2.

Figure 4-1 1H582-51 Expansion Module and Fixed Front Panel Port Numbering Scheme

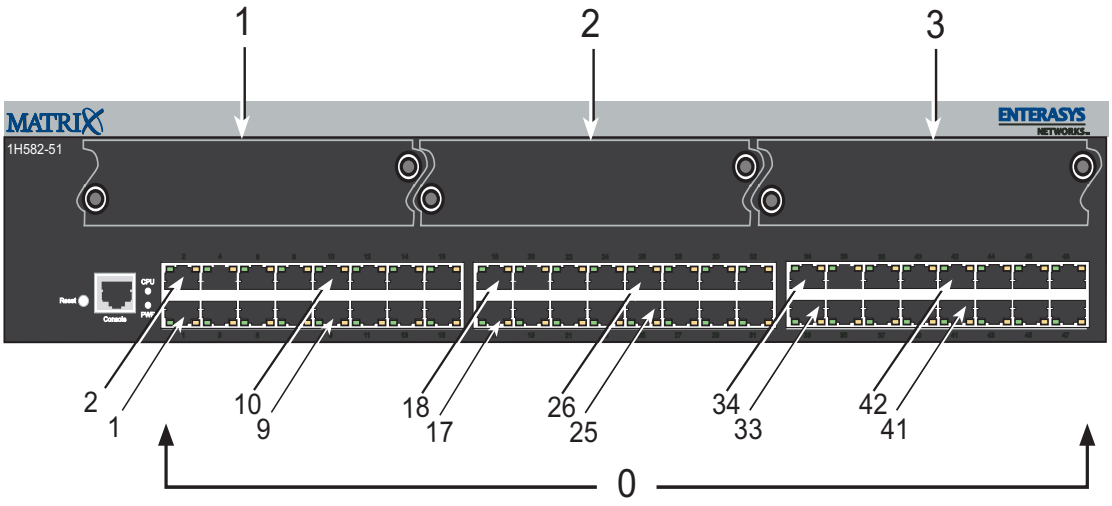

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Figure 4-2 Optional Ethernet Expansion Modules

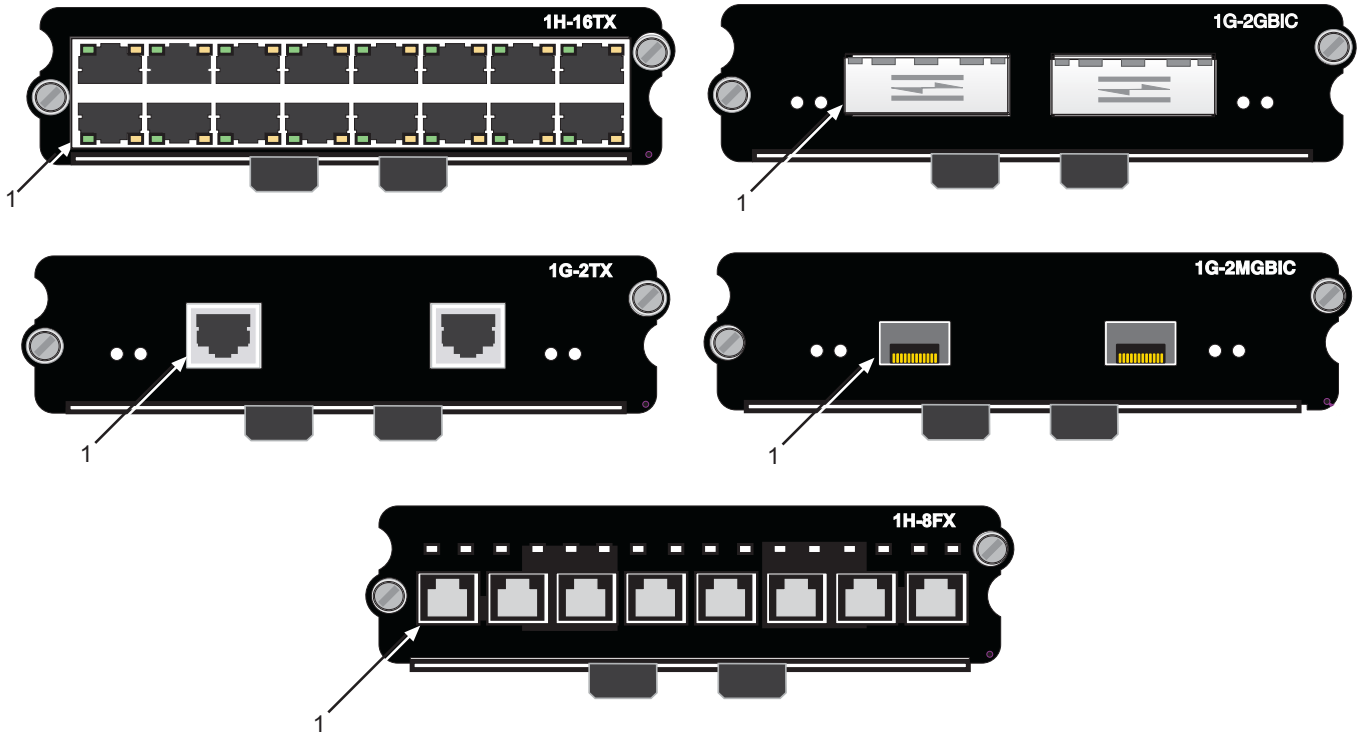

Table 4-1 Ethernet Expansion Module Interface Types and Port Numbering

Ethernet expansion module	Interface Type	Port Numbering
1H-16TX	Fast Ethernet 10/100BASE-TX	Sixteen fixed RJ45 ports | 1 | 3 | 5 | 7 | 9 | 11 | 13 | 15 | | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
1G-2TX	Fast Ethernet 1000BASE-TX	Two fixed RJ45 ports | 1 | 2 |
1G-2GBIC	Gigabit 1000BASE-SX/LX	Two port slots for optional GBICs (GBICs have 1 SC connector) | 1 | 2 |

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Table 4-1 Ethernet Expansion Module Interface Types and Port Numbering (Continued)

Ethernet expansion module	Interface Type	Port Numbering
1G-2MGBIC	1000BASE-SX	Two slots for optional Mini-GBICs (Mini-GBICs have 1 MT-RJ connector) | 1 | 2 |
1H-8FX	100BASE-FX	Eight fixed MT-RJ connectors | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

4.1.2 Port String Syntax Used in the CLI

Commands requiring a *port-string* parameter use the following syntax to designate port type and location:
port type.slot location.port number

Where **port type** can be:
fe, for Fast Ethernet; or
ge, for 1-Gigabit Ethernet
lag, for Link Aggregator
lbpk, for loopback interfaces
host, for the host (management) port

Slot location can be:
0, for the fixed front panel slot,
1, for left expansion module slot (in the 1H582-51 and 1G58x-09 devices), or the single expansion module slot (in the 1H582-25 device)
2, for middle expansion module slot, or
3, for right expansion module slot

Port number can be:
Any port number in a slot location.
The highest port number that can be entered is dependent on the number of ports in a slot location.

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For example: The Matrix E1 1H582-51 has 48 front panel ports (group **0**), and the number of ports in group **1**, **2**, or **3** is dependent on the expansion module installed in the slot.

Examples

This example shows the *port-string* syntax for specifying Fast Ethernet port 3 in the device's fixed front panel.

```
fe.0.3
```

This example shows the *port-string* syntax for specifying Fast Ethernet ports 1 through 10 in the device's fixed front panel.

```
fe.0.1-10
```

This example shows the *port-string* syntax for specifying Fast Ethernet ports 1, 3, 7, 8, 9 and 10 in the device's left expansion module slot.

```
fe.1.1,fe.1.3,fe.1.7-10
```

This example shows the *port-string* syntax for specifying Gigabit Ethernet port 2 in the device's right expansion module slot.

```
ge.3.2
```

This example shows the *port-string* syntax for specifying all Gigabit Ethernet ports in the device's left expansion module slot.

```
ge.1.*
```

This example shows the *port-string* syntax for specifying all Fast Ethernet ports in the device.

```
fe.*.*
```

This example shows the *port-string* syntax for specifying all ports (of any interface type) in the device.

```
*.*.*
```


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4.2 PROCESS OVERVIEW: PORT CONFIGURATION

Use the following steps as a guide to configuring ports on the device:

1. Reviewing port status (Section 4.3.1)
2. Disabling / enabling ports (Section 4.3.2)
3. Setting speed and duplex mode (Section 4.3.3)
4. Enabling / disabling jumbo frame support (Section 4.3.4)
5. Setting auto negotiation and advertised ability (Section 4.3.5)
6. Setting flow control and thresholds (Section 4.3.6)
7. Setting port traps (Section 4.3.7)
8. Setting port mirroring (Section 4.3.9)
9. Configuring port trunking and link aggregation (Section 4.3.10)
10. Configuring port broadcast suppression (Section 4.3.14)
11. Configuring unknown destination address suppression (Section 4.3.15)

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4.3 PORT CONFIGURATION COMMAND SET

4.3.1 Reviewing Port Status

Purpose

To display port operating status, duplex mode, speed and port type, and statistical information about traffic received and transmitted through one port or all ports on the device.

Commands

The commands needed to review port status are listed below and described in the associated sections as shown.

- show port status (Section 4.3.1.1)
- show port counters (Section 4.3.1.2)
- clear port counters (Section 4.3.1.3)

4.3.1.1 show port status

Use this command to display duplex mode, speed and port type, and statistical information about traffic received and transmitted through one or more ports on the device.

show port status [*port-string*]

Syntax Description

port-string	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display status information for Fast Ethernet front panel ports 15 through 18:

```
Matrix>show port status fe.0.15-18

Port       Oper    Admin   Duplex  Speed    Flow   Type
           Status  Status                   Ctrl
 ------------------------------------------------------------
 fe.0.15  down     up      half     10       N/A   100base-TX
 fe.0.16  down     up      half     10       N/A   100base-TX
 fe.0.17  down     up      full     100      N/A   100base-TX
 fe.0.18  down     up      half     10       N/A   100base-TX
```

Table 4-2 provides an explanation of the command output.

Table 4-2 show port status Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
Oper Status	Whether the specified port has a valid link. Oper status will be down until a link is established to an external device and the port is enabled.
Admin Status	Whether the specified port is enabled (up) or disabled (down). For details on using the **set port disable** command to change the default port status of enabled, refer to Section 4.3.2.1. For details on using the **set port enable** command to re-enable ports, refer to Section 4.3.2.2.
Duplex	Duplex mode (half or full) of the specified port. For details on using the **set port duplex** command to change defaults, refer to Section 4.3.3.4.
Speed	Operational speed in Mbps (10, 100 or 1000) of the specified port. For details on using the **set port speed** command to change defaults, refer to Section 4.3.3.2.

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Table 4-2 show port status Output Details

Output	What It Displays...
Flow Ctrl	Whether flow control status is enabled, disabled, or N/A (auto negotiation is enabled).
Type	Port type as: • 10/100TX: 10Base-T/100Base-T • 100FX: 100Base-FX • 1000SX: 1000Base-SX • 1000LX: 1000Base-LX

4.3.1.2 show port counters

Use this command to display counter statistics detailing traffic through the switch and through all MIB2 network devices.

show port counters [*port-string*] [**mib2** | **switch**]

Syntax Description

port-string	(Optional) Displays counter statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
mib2 | **switch**	(Optional) Displays MIB2 or switch statistics. Switch statistics detail performance of the Matrix E1 switch device. MIB2 interface statistics detail performance of all network devices.

Command Defaults

If *port-string* is not specified, counter statistics will be displayed for all ports. If **mib2** or **switch** is not specified, all counter statistics will be displayed for the specified port(s).

Command Type

Switch command.

Command Mode

Read-Only.

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Examples

This example shows how to display all counter statistics, including MIB2 network traffic and traffic through the device for Fast Ethernet front panel port 1:

```
Matrix>show port counters fe.0.1

Port: fe.0.1     Bridge Port: 1
---------------------------------------
MIB2 Interface Counters:
In  Octets:             0
In  Unicast Pkts:       0
In  Multicast Pkts:     0
In  Broadcast Pkts:     0
In  Discards:           0
In  Errors:             0
In  Unknown Protocol:   0
Out Octets:             0
Out Unicast Pkts:       0
Out Multicast Pkts:     0
Out Broadcast Pkts:     0
Out Discards:           0
Out Errors:             0
Out Queue Length:       0

802.1Q Switch Counters:
Frames Received:        0
Frames Transmitted:     0
```

This example shows how to display all port counter statistics related to traffic through the device.

```
Matrix>show port counters fe.0.1 switch
 Port: fe.0.1     Bridge Port: 1

 802.1Q Switch Counters:
 ----------------------
 Frames Received:        0
 Frames Transmitted:     0
```

Table 4-3 provides an explanation of the command output.

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Table 4-3 show port counters Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
Bridge Port	Spanning Tree bridge port designation.
MIB2 Interface Counters	MIB2 network traffic counts.
802.1Q Switch Counters	Counts of frames received and transmitted.

4.3.1.3 clear port counters

Use this command to clear port counter statistics for one or more ports.

clear port counters [*port-string*]

Syntax Description

port-string	(Optional) Clears counter statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, counter statistics will be cleared for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all counter statistics for Fast Ethernet front port panel 42:

```
Matrix>clear port counters fe.0.42
```


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4.3.2 Disabling / Enabling Ports

Purpose

To disable and re-enable one or more ports. By default, all ports are enabled at device startup. You may need to disable ports in the event of network problems or to put ports “off-line” during certain configuration procedures.

Commands

The commands needed to enable and disable ports are listed below and described in the associated section as shown.

- set port disable (Section 4.3.2.1)
- set port enable (Section 4.3.2.2)

4.3.2.1 set port disable

Use this command to administratively disable one or more ports.

set port disable *port-string*

Syntax Description

port-string	Specifies the port(s) to disable. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Fast Ethernet front panel port 1:

```
Matrix>set port disable fe.0.1
```


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4.3.2.2 set port enable

Use this command to administratively enable one or more ports.

set port enable *port-string*

Syntax Description

port-string	Specifies the port(s) to enable. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Fast Ethernet front panel port 3:

```
Matrix>set port enable fe.0.3
```

4.3.3 Setting Speed and Duplex Mode

Purpose

To set the current operational speed in Mbps and to set the default duplex mode: **Half**, for half duplex, or **Full**, for full duplex.

NOTE: These settings only take effect on ports that have auto-negotiation disabled.

Commands

The commands needed to set port speed and duplex mode are listed below and described in the associated section as shown.

- show port speed (Section 4.3.3.1)

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- set port speed (Section 4.3.3.2)
- show port duplex (Section 4.3.3.3)
- set port duplex (Section 4.3.3.4)

4.3.3.1 show port speed

Use this command to display the configured port speed used when the port's auto-negotiation state is disabled. Note that the configured speed may be different from the current assigned speed, if auto-negotiation is enabled.

show port speed [*port-string*]

Syntax Description

port-string	(Optional) Specifies the port(s) for which speed will be displayed. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If a port string is not entered, configured port speed settings for all ports are displayed.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to display configured port speed for front panel ports 10 through 16:

```
E1-2>show port speed fe.0.10-16
When autonegotiation is disabled,
the port speed setting is:
port      speed
--------------------
fe.0.10   10
fe.0.11   10
fe.0.12   10
fe.0.13   10
fe.0.14   10
fe.0.15   10
fe.0.16   10
```

4.3.3.2 set port speed

Use this command to configure the default speed of a port interface. This setting only takes effect on ports that have auto-negotiation disabled.

You can use this command to configure the default speed of a port while auto-negotiation is enabled. However, the configured speed will not take effect until auto-negotiation is disabled.

set port speed *port-string* {**10** | **100** | **1000**}

Syntax Description

port-string	Specifies the port(s) for which speed will be set. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
10 | **100** | **1000**	Specifies the port speed. Settings can be **10** Mbps, **100** Mbps, or **1000** Mbps.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set Fast Ethernet expansion module 3, port 9, to a port speed of 10 Mbps:

```
Matrix>set port speed fe.3.9 10
```

4.3.3.3 show port duplex

Use this command to display the configured port duplex setting (half or full) for one or more ports used when the port's auto-negotiation state is disabled. Note that the configured duplex setting may be different from the current assigned setting, if auto-negotiation is enabled.

show port duplex [*port-string*]

Syntax Description

port-string	(Optional) Specifies the port(s) for which duplex setting will be displayed. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If a port string is not entered, configured port duplex settings for all ports are displayed.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to display configured port duplex setting for front panel ports 10 through 16:

```
E1-2>show port duplex fe.0.10-16
When autonegotiation is disabled,
the port duplex setting is:
port      duplex
--------------------
fe.0.10   half
fe.0.11   half
fe.0.12   half
fe.0.13   half
fe.0.14   half
fe.0.15   half
fe.0.16   full
```

4.3.3.4 set port duplex

Use this command to configure the duplex type of one or more ports. This setting only takes effect on ports that have auto-negotiation disabled.

You can use this command to configure the default duplex setting of a port while auto-negotiation is enabled. However, the configured setting will not take effect until auto-negotiation is disabled.

set port duplex *port-string* {**full** | **half**}

Syntax Description

port-string	Specifies the port(s) for which duplex type will be set. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
full | **half**	Sets the port to full-duplex or half-duplex operation.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set Fast Ethernet front panel port 17 to full duplex:

```
Matrix>set port duplex fe.0.17 full
```

4.3.4 Enabling / Disabling Jumbo Frame Support

Purpose

To review, enable, and disable jumbo frame support on all ports. This allows ports to transmit frames up to 6 KB in size.

Commands

The commands used to review, enable and disable jumbo frame support are listed below and described in the associated section as shown.

- show port jumbo (Section 4.3.4.1)
- set port jumbo (Section 4.3.4.2)

4.3.4.1 show port jumbo

Use this command to display the status of jumbo frame support and maximum transmission units (MTU) on one or more ports.

show port jumbo

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the status of jumbo frame support:

```
Matrix>show port jumbo

Port Number  Jumbo Oper Status   Jumbo Admin Status    Jumbo MTU
-------------------------------------------------------------------
ge.0.1-6      disabled            disabled              6144
```

4.3.4.2 set port jumbo

Use this command to enable or disable jumbo frame support on all ports.

set port jumbo {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables jumbo frame support.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable jumbo frame support:

```
Matrix>set port jumbo enable
```


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4.3.5 Setting Port Auto-Negotiation and Advertised Ability

Purpose

To determine whether auto-negotiation is enabled or disabled for the specific port and to set the state, and to display or set a port's advertised mode of operation.

During auto-negotiation and advertised ability, the port "tells" the device at the other end of the segment what its capabilities and mode of operation are. If auto-negotiation is disabled, the port reverts to the values specified by default speed, default duplex, and the port flow control commands.

In normal operation, with all capabilities enabled, advertised ability enables a port to "advertise" that it has the ability to operate in any mode. The user may choose to configure a port so that only a portion of its capabilities are advertised and the others are disabled.

NOTE: Advertised ability can be activated only on ports that have auto-negotiation enabled.

Commands

The commands needed to configure auto-negotiation are listed below and described in the associated section as shown.

- show port negotiation (Section 4.3.5.1)
- set port negotiation (Section 4.3.5.2)
- show port advertised ability (Section 4.3.5.3)
- set port advertised ability (Section 4.3.5.4)

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4.3.5.1 show port negotiation

Use this command to display the status of auto-negotiation for one or more ports.

show port negotiation [*port-string*]

Syntax Description

port-string	(Optional) Displays auto-negotiation status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, auto-negotiation status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display auto-negotiation status on Fast Ethernet expansion module 3, port 1:

```
Matrix>show port negotiation fe.3.1
 Auto negotiation enabled for port fe.3.1.
```


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4.3.5.2 set port negotiation

Use this command to enable or disable auto-negotiation on one or more ports.

set port negotiation *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable auto-negotiation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable** |	Enables or disables auto-negotiation.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable auto-negotiation on Fast Ethernet front panel port 11:

```
Matrix>set port negotiation fe.0.11 disable
```


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4.3.5.3 show port advertised ability

Use this command to display the advertised ability on one or more ports.

show port advertised ability [*port-string* [**verbose**]]

Syntax Description

port-string	(Optional) Displays advertised ability for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
verbose	(Optional) Displays more detail about the port's advertised ability.

Command Defaults

If *port-string* is not specified, advertised ability for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This command shows the display of advertised ability when advertising of flow control has been enabled with the **set port advertised ability** command:

```
Matrix>show port advertised ability fe.0.1-4
Port         Advertised Ability
--------    ------------------------------------------------
fe.0.1      10half 10full 100half 100full full duplex flow control
fe.0.2      10half 10full 100half 100full full duplex flow control
fe.0.3      10half 10full 100half 100full full duplex flow control
fe.0.4      10half 10full 100half 100full full duplex flow control
```


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This command shows the verbose display of advertised ability for port fe.0.1 :

```
Matrix>show port advertised ability fe.0.1 verbose
fe.0.1           Capability       Advertised       Remote
-------------------------------------------------------------
BASE10-T             yes              yes             yes
BASE10-TFD           yes              yes             no
BASE100-TX           yes              yes             no
BASE100-TXFD         yes              yes             no
BASE1000-X           no               no              no
BASE1000-XFD         no               no              no
BASE1000-T           no               no              no
BASE1000-TFD         no               no              no
pause                yes              yes             no
```

Table 4-4 provides an explanation of the verbose command output.

Table 4-4 VerboseOutput Details

Output	What It Displays...
Capability	Whether or not the port is capable of operating in the following modes: • **BASE10-T** - 10BASE-T half duplex mode • **BASE10-TFD** - 10BASE-T full duplex mode • **BASE100-TX** - 100BASE-TX half duplex mode • **BASE100-TXFD** - 100BASE-TX full duplex mode • **BASE1000-X** - 1000BASE-X, -LX, -SX, -CX half duplex mode • **BASE1000-XFD** - 1000BASE-X, -LX, -SX, -CX full duplex mode • **BASE1000-T** - 1000BASE-T half duplex mode • **BASE1000-TFD** - 1000BASE-T full duplex mode • **pause** - PAUSE for full-duplex links
Advertised	Whether or not the port is configured to advertise it is capable of operating in the modes listed.
Remote	Whether this port's link partner is advertising the listed mode. On fiber ports, the switch is unable to get the remote information, so "---" is displayed instead of "yes" or "no."

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This example shows how to display advertised ability on all ports. Since this example does not display flow control, advertising flow control was not enabled with the **set port advertised ability** command.

```
Matrix>show port advertised ability
Port        Advertised Ability
--------   ------------------------------------------------
fe.0.1     10half 10full 100half 100full
fe.0.2     10half 10full 100half 100full
fe.0.3     10half 10full 100half 100full
fe.0.4     10half 10full 100half 100full
fe.0.5     10half 10full 100half 100full
fe.0.6     10half 10full 100half 100full
fe.0.7     10half 10full 100half 100full
fe.0.8     10half 10full 100half 100full
fe.0.9     10half 10full 100half 100full
fe.0.10    10half 10full 100half 100full
fe.0.11    10half 10full 100half 100full
fe.0.12    10half 10full 100half 100full
fe.0.13    10half 10full 100half 100full
fe.0.14    10half 10full 100half 100full
fe.0.15    10half 10full 100half 100full
fe.0.16    10half 10full 100half 100full
fe.0.17    10half 10full 100half 100full
fe.0.18    10half 10full 100half 100full
fe.0.19    10half 10full 100half 100full
--More--
```


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4.3.5.4 set port advertised ability

Use this command to enable or disable and to configure the advertised ability on one or more ports.

set port advertised ability *port-string* {**10** | **100** | **1000** | **all**} {**half** | **full** | **all**} {**flowcontrol**} {**disable** | **enable**}

Syntax Description

port-string	Specifies the port(s) for which to enable, disable or configure advertised ability. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
10 | **100** | **1000** | **all**	Specifies a speed for the port to advertise in Mbps, or enables the port to advertise all the speeds at which it can operate.
half | **full** | **all**	Specifies a duplex mode for the port to advertise, or enables the port to advertise all the duplex modes at which it can operate.
flowcontrol	Specifies flow control for advertisement.
disable | **enable**	Disables or enables advertised ability with the parameters specified.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Fast Ethernet front panel port 1 from advertising any speed or duplex settings:

```
Matrix>set port advertised ability fe.0.1 all disable
```


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4.3.6 Setting Flow Control and Thesholds

About Managing Oversubscribed Ports

At times during normal switch operation, a burst of traffic could temporarily oversubscribe an egress port. Oversubscribed means more traffic is destined to a port than it can transmit. The two general approaches to handle this situation are flow control and Head of Line (HOL) Blocking Prevention.

Exerting flow control causes the oversubscribed port to inform the port or ports transmitting to the congested port to temporarily stop sending frames so the egress port can “catch up”. This has the side effect of preventing the senders from sending any frames — not just frames to the congested destination port. Thus, flow control can negatively affect traffic to uncongested ports.

Head of Line Blocking Prevention uses a different approach. Head of Line blocking occurs when a switch can’t accept frames because frames already in the system can’t leave fast enough, causing congestion. When enabled, Head of Line Blocking Prevention drops congested frames unable to leave the switch, allowing it to always accept new frames. Instead of exerting flow control, HOL Blocking Prevention drops frames after a pre-defined number of frames are queued to the congested port. This prevents flow control from hampering other uncongested ports at the expense of dropping frames to the congested port.

CAUTION: Port threshold configuration should be performed only by personnel who are knowledgeable about the effects of setting thresholds and its impact on network operation.

Purpose

To configure port flow control, buffer controls and Head of Line (HOL) Blocking Prevention thresholds.

Commands

The commands needed to set port flow control and thresholds are listed below and described in the associated section as shown.

- show port flowcontrol (Section 4.3.6.1)
- set port flowcontrol (Section 4.3.6.2)
- show port buffer threshold (Section 4.3.6.3)
- set port buffer threshold (Section 4.3.6.4)

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- show flow agetime (Section 4.3.6.5)
- set flow agetime (Section 4.3.6.6)
- clear flow agetime (Section 4.3.6.7)
- show port holbp (Section 4.3.6.8)
- set port holbp (Section 4.3.6.9)

4.3.6.1 show port flowcontrol

Use this command to display the flow control state for one or more ports.

show port flowcontrol [*port-string*]

Syntax Description

port-string	(Optional) Displays flow control state for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, flow control statistics for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port flow control state for Fast Ethernet front panel ports 15 through 18. It shows that auto-negotiation is enabled on ports 15 and 18 (therefore, flow control cannot be enabled on these ports). It also shows that flow control is disabled on port 16, and enabled on port 17:

```
Matrix>show port flowcontrol fe.0.15-18
 Port fe.0.15 flow control state is auto negotiate.
 Port fe.0.16 flow control state is disabled.
 Port fe.0.17 flow control state is enabled.
 Port fe.0.18 flow control state is auto negotiate.
```


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4.3.6.2 set port flowcontrol

Use this command to enable or disable flow control for one or more ports. Note that you cannot execute this command if auto-negotiation is enabled.

set port flowcontrol *port-string* {**disable** | **enable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable flow control. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
disable | **enable**	Disables or enables flow control.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable flow control on Fast Ethernet front panel ports 21 through 24:

```
Matrix>set port flowcontrol fe.0.21-24 enable
```


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4.3.6.3 show port buffer threshold

Use this command to display port buffer threshold settings.

show port buffer threshold

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display port buffer threshold settings. The output shows percentages applied per port group for each priority queue within various ingress and egress threshold types, and percentages applied for buffers within the EgressGeneral and IngressRx threshold types. For more information on these threshold types and how to configure them using the **set port buffer threshold** command, refer to Section 4.3.6.4:

```
Matrix>show port buffer threshold
!                      Fast Ethernet             Gigabit Ethernet
!                    Priority  Queue              Priority Queue
!                   0     1     2     3       0     1     2     3
Threshold
IngressHOL          50.0  50.0  50.0  50.0 :  50.0  50.0  50.0  50.0
IngressSoftHOL      25.0  25.0  25.0  25.0 :  25.0  25.0  25.0  25.0
EgressUniPrio       25.0  25.0  25.0  25.0 :  25.0  25.0  25.0  25.0
EgressMultiPrio     25.0  25.0  25.0  25.0 :  25.0  25.0  25.0  25.0
EgressAllPrio      100.0 100.0 100.0 100.0 : 100.0 100.0 100.0 100.0
EgressHOL           12.5  12.5  12.5  12.5 :  25.0  25.0  25.0  25.0
EgressSoftHOL       12.5  12.5  12.5  12.5 :  20.0  20.0  20.0  20.0

!                   Uni   Multi Rtr            Uni   Multi Rtr
EgressGeneral       25.0  50.0  50.0       :   50.0  50.0  50.0

!                  Port  FC On  FC Off         Port  FC On FC Off
IngressRx           18.0  12.0  15.0       :    2.0   1.5   1.8
```


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4.3.6.4 set port buffer threshold

Use this command to configure buffer threshold settings for a group of ports. This command applies priority queue or buffer percentages to various types of ingress or egress thresholds, and can also be used to reset all thresholds back to default values. Ingress thresholds are used for buffer control at the point the frame enters the switch. Egress thresholds are used for buffer control at the point after the frame has been accepted into the system, and before it has been transmitted out the destination port.

set port buffer threshold *threshold portgroup* {*queue0 queue1 queue2 queue3* | *receive-buffers xon-limit xoff-limit* | *unicast-per-port multicast router-block*}

Syntax Description

threshold	Sets the threshold type. Valid entries and their corresponding actions are: • **IngressRx** - controls frames entering the switch for a given port. • **IngressHOL** - drops all frames after the set percentage of buffers for the given priority queue are awaiting transmission to other port destinations. • **IngressSoftHOL** - drops frames marked as discardable after the set percentage of buffers for the given priority queue are awaiting transmission to other port destinations. • **EgressUniPrio** - sets buffer percentages per port, per priority queue for unicast traffic. • **EgressMultiPrio** - sets buffer percentages per port, per priority queue for multicast traffic. • **EgressAllPrio** - sets buffer percentages per port, per priority queue for multicast and unicast traffic. • **EgressHOL** - drops all frames after the set percentage of buffers for the given priority queue are waiting to be transmitted on their destination port queue. • **EgressSoftHOL** - drops frames marked as discardable after the set percentage of buffers for the given priority queue are awaiting transmission to other port. destinations.

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threshold (Cont'd)	• **EgressGeneral** - controls the buffer allocations for unicast frames destined to a single egress port, for multicast frames queued for egress per device, and for frames destined for routing ports. • **ResetAll** - resets all threshold types.
portgroup	Specifies the port group on which buffer thresholds will be set as: • **fe** - Fast Ethernet • **ge** - Gigabit Ethernet, or • **all**
queue0 - queue3	Sets the percentage to allocate to each of four priority queues. Valid values are **1** to **100**, rounded to the nearest 0.1%, and must be entered in decimal format: **00.0**. If the sum of these percentages is greater than 100%, then buffer sharing is allowed amongst the queues.
receive-buffer	When the **IngressRX** threshold type is chosen, sets the percentage of buffers a port is allowed to use. Valid values are **1** to **100**, rounded to the nearest 0.1%, and must be entered in decimal format: **00.0**. *Receive-buffer* percentage must be higher than the *xoff-limit*, which must be higher than the *xon-limit*.

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xon-limit *xoff-limit*	When the **IngressRX** threshold type is chosen, sets the Xon and Xoff limits. When this limit is reached, the receiving port sends flow control pause frames the sending port requesting that transmissions be "turned off". Once the sending port responds to the request, the frames will empty until the Xon threshold is reached. The receiving port then ceases sending flow control pause frames allowing transmissions from the sending port to be "turned back on". Valid values are **1** to **100**, rounded to the nearest 0.1%, and must be entered in decimal format: **00.0**. In order for proper configuration of buffer settings, the *receive-buffer* percentage must be higher than the *xoff-limit*, which must be higher than the *xon-limit*. **NOTE:** Xon-limit and Xoff-limit settings are only active when flow control is enabled. To check the status of flow control on one or more ports, use the **show port flowcontrol** command (Section 4.3.6.1).
unicast-per-port *multicast* *router-block*	When the **EgressGeneral** threshold type is chosen, sets the percentage to allocate to each buffer. Valid values are **1** to **100**, rounded to the nearest 0.1%, and must be entered in decimal format: **00.0**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set all buffer queues to 25 percent for multicast and unicast traffic switched out all Fast Ethernet ports:

```
Matrix>set port buffer threshold egressallpri fe 25.0 25.0 25.0 25.0
```


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This example shows how to set the receive buffer and the flow control on and off limit buffers within the IngressRX threshold for frames destined for Gigabit Ethernet ports:

```
Matrix>set port buffer threshold ingressrx ge 30.0 20.0 25.0
```

This example shows how to reset all port threshold buffers to default values:

```
Matrix>set port buffer threshold resetall
```

4.3.6.5 show flow agetime

Use this command to display the flow age time setting. This is the amount of time in seconds until a flow control entry will be removed if no activity has occurred on the flow.

show flow agetime

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

None.

Example

This example shows how to display the flow age time setting:

```
Matrix>show flow agetime
Flow age time: 30
```


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4.3.6.6 set flow agetime

Use this command to set the number of seconds flow control entries will remain active if no activity occurs on the flow.

set flow agetime *time*

Syntax Description

time	Specifies the number of seconds before flow limiting entries will age out. Valid values are **1** - **600**.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the flow limit age time to 200 seconds:

```
Matrix>set flow agetime 200
```

4.3.6.7 clear flow agetime

Use this command to resets the number of seconds flow control entries will remain active to the default value of 30 seconds.

clear flow agetime

Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Example

This example shows how to reset the flow limit age time to 30 seconds:

```
Matrix>clear flow agetime
```

4.3.6.8 show port holbp

Use this command to display Head of Line (HOL) Blocking Prevention settings for one or more ports.

show port holbp *port-string* {**ingress** | **egress**}

Syntax Description

port-string	Specifies the port(s) for which to display HOL Blocking Prevention settings. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
ingress | **egress**	Displays ingress or egress HOL settings. Ingress thresholds are used for buffer control at the point the frame enters the switch. Egress thresholds are used for buffer control at the point after the frame has been accepted into the system, and before it has been transmitted out the destination port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display HOL Blocking Prevention settings for egress frames received on Gigabit Ethernet front panel ports. In this case, HOL is enabled on all priority queues for all Gigabit Ethernet ports. When these ports' buffer queues, ingress or egress, get congested, frames will be dropped after their respective buffer thresholds have been reached. Threshold types and

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limits must be configured using the s**et port buffer threshold** command as described in Section 4.3.6.4:

```
Matrix>show port holbp ge.0.* egress
Port             Egress  HOL Priority Queue
                0          1          2          3
ge.0.1     enabled    enabled    enabled    enabled
ge.0.2     enabled    enabled    enabled    enabled
ge.0.3     enabled    enabled    enabled    enabled
ge.0.4     enabled    enabled    enabled    enabled
ge.0.5     enabled    enabled    enabled    enabled
ge.0.6     enabled    enabled    enabled    enabled
```

4.3.6.9 set port holbp

Use this command to enables or disable Head of Line (HOL) Blocking Prevention for one or more ports. HOL Blocking Prevention drops frames after a pre-defined number of frames are queued to a congested port. This prevents flow control from hampering other uncongested ports at the expense of dropping frames to the congested port.

set port holbp *port-string* {**ingress** | **egress**}{**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable HOL Blocking Prevention. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
ingress | **egress**	Enables or disables HOL Blocking Prevention on ingress (just entered the switch) or egress (in the system and before transmission) frames.
enable | **disable**	Enables or disables HOL Blocking Prevention. **NOTES:** If switch ports are congested, disabling HOL Blocking Prevention without enabling flow control will result in frames being dropped at the ingress port (in addition to causing potentially unnecessary congestion inside the switch).

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to enable egress HOL Blocking Prevention on Fast Ethernet front panel port 2:

```
Matrix>set port holbp fe.0.2 egress enable
```


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4.3.7 Setting Port Traps

Purpose

To display the status, and to enable or disable an SNMP link trap on one or more ports. This operation is typically used to alert the system manager of a change in the link status of the port.

Command

The commands needed to display, enable or disable port traps are listed below and described in the associated section as shown.

- show port trap (Section 4.3.7.1)
- set port trap (Section 4.3.7.2)

4.3.7.1 show port trap

Use this command to display the status of an SNMP link trap on one or more ports.

show port trap [*port-string*]

Syntax Description

port-string	(Optional) Displays trap status for specific port(s). For a detailed description of possible port-string values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, the trap status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Write.

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Examples

This example shows how to display SNMP link trap status for Fast Ethernet front panel ports 1 through 3:

```
Matrix>show port trap fe.0.1-3
  Port      State
 --------- ---------
 fe.0.1   enabled
 fe.0.2   enabled
 fe.0.3   enabled
```

This example shows how to display SNMP link trap status for all ports:

```
Matrix>show port trap
 Port      State       Port      State       Port      State
 --------- ---------   --------- ---------   --------- ---------
 fe.0.1   enabled      fe.0.2   enabled      fe.0.3   enabled
 fe.0.4   enabled      fe.0.5   enabled      fe.0.6   enabled
 fe.0.7   enabled      fe.0.8   enabled      fe.0.9   enabled
 fe.0.10  enabled      fe.0.11  enabled      fe.0.12  enabled
 fe.0.13  enabled      fe.0.14  enabled      fe.0.15  enabled
 fe.0.16  enabled      fe.0.17  enabled      fe.0.18  enabled
 fe.0.19  enabled      fe.0.20  enabled      fe.0.21  enabled
 fe.0.22  enabled      fe.0.23  enabled      fe.0.24  enabled
 fe.0.25  enabled      fe.0.26  enabled      fe.0.27  enabled
 fe.0.28  enabled      fe.0.29  enabled      fe.0.30  enabled
 fe.0.31  enabled      fe.0.32  enabled      fe.0.33  enabled
 fe.0.34  enabled      fe.0.35  enabled      fe.0.36  enabled
 fe.0.37  enabled      fe.0.38  enabled      fe.0.39  enabled
 fe.0.40  enabled      fe.0.41  enabled      fe.0.42  enabled
 fe.0.43  enabled      fe.0.44  enabled      fe.0.45  enabled
 fe.0.46  enabled      fe.0.47  enabled      fe.0.48  enabled
```


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4.3.7.2 set port trap

Use this command to enable or disable an SNMP link trap on one or more ports.

set port trap *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) for which to enable or disable a trap. For a detailed description of possible port-string values, refer to Section 4.1.2.
enable | **disable**	Enables or disables a trap on the specified port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable the SNMP link trap for Fast Ethernet front panel port 3:

```
Matrix>set port trap fe.0.3 disable
```


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4.3.8 Overview: Port Mirroring

CAUTION: Port mirroring configuration should be performed only by personnel who are knowledgeable about the effects of port mirroring and its impact on network operation.

The Matrix E1 allows you to mirror the traffic being switched on one or more ports for the purposes of network traffic analysis and connection assurance. When port mirroring is enabled, one port becomes a monitor port for other ports within the device. When configuring port mirroring on this device, note that

- A given source port may only be mirrored to one target port. However, multiple source ports may be mirrored to the same target port.
- Only one port per port grouping can be designated as a source port. For more information on port grouping designations, refer to Section 4.3.10.2.
- A maximum of 12 source/target port pairs may be configured.
- Traffic mirrored includes both received and transmitted packets.
- Unknown protocol packets and broadcast packets can be forwarded out the monitor port when mirroring is enabled.
- None of the ports in a trunk or LAG should be configured as a mirror source port or mirror target port. If a port with an active LACP link is configured as a mirror source or target port, the LACP link will be brought down. Note that all eight ports in the same port group are affected—once one port in the group is mirrored, any other LACP ports in the same group will be removed from the trunk. For more information about link aggregation, refer to Section 4.3.10.

For details on how to specify port designation in the CLI syntax, refer to Section 4.1.2.

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4.3.9 Setting Port Mirroring

Purpose

To display or set a source and target port for port mirroring on the device, or to clear a port mirroring relationship.

Commands

The commands needed to configure port mirroring are listed below and described in the associated section as shown.

- show port mirroring (Section 4.3.9.1)
- set port mirroring (Section 4.3.9.2)
- clear port mirroring (Section 4.3.9.3)

4.3.9.1 show port mirroring

Use this command to display the source and target ports for mirroring, and whether mirroring is currently enabled or disabled for those ports.

show port mirroring

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display port mirroring information. In this case, two mirroring configurations have been set. Fast Ethernet front panel port 11 is mirroring traffic from Fast

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Ethernet front panel port 4, and Fast Ethernet front panel port 23 is mirroring traffic from Fast Ethernet front panel port 19. Mirroring is currently disabled on the device:

```
Matrix>show port mirroring

Port Mirroring Status : Disabled
================================
Source Port = fe.0.4
Target Port = fe.0.11
================================
Source Port = fe.0.19
Target Port = fe.0.23
```

4.3.9.2 set port mirroring

Use this command to enable, disable or configure mirroring between ports.

set port mirroring {**disable** | **enable** | *source_port target_port*}

Syntax Description

disable | **enable**	Disables or enables port mirroring.
source_port	Specifies the port designation for the source on which the traffic will be monitored. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
target_port	Specifies the port designation for the target that will duplicate or "mirror" all the traffic on the monitored port. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

NOTES: A given source port may only be mirrored to one target port. However, multiple source ports may be mirrored to the same target port.

Only one port per port grouping can be designated as a source port. For more information on port grouping designations, refer to Section 4.3.10.2.

A maximum of 12 source/target port pairs may be configured.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Examples

This example shows how to set port mirroring with fe.0.4 as the source port and fe.0.11 as the target port:

```
Matrix>set port mirroring fe.0.4 fe.0.11
```

This example shows how to disable port mirroring:

```
Matrix>set port mirroring disable
```

4.3.9.3 clear port mirroring

Use this command to clear a mirroring association between ports.

clear port mirroring *source_port*

Syntax Description

source_port	Specifies the source port for the mirroring association to be cleared. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear port mirroring for source port fe.0.4:

```
Matrix>clear port mirroring fe.0.4
```


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4.3.10 Configuring Link Aggregation

Link aggregation — using multiple links simultaneously — is a powerful feature for increasing the bandwidth of a network connection and for ensuring fault recovery. Matrix E1 devices support the following two methods of link aggregation:

- Port Trunking — Statically grouping ports by creating and assigning ports to a “trunk”. Trunking is a term used in earlier (proprietary) implementations of port aggregation on Matrix E1 devices. For details, refer to Section 4.3.11.
- 802.3ad — Enabling and configuring the 802.3ad Link Aggregation Control Protocol to logically group port interfaces together to create a greater bandwidth uplink. For details, refer to Section 4.3.13.

By default, a Matrix E1 device running firmware version 3.xx.xx and later is set to 802.3ad mode for managing link aggregation. If you are upgrading Matrix E1 firmware from a previous image in which port trunks were configured, the device will remain in port trunking mode. To change the link aggregation mode on the device, use the **set port trunkmode** command as described in Section 4.3.11.2.

CAUTION: Link aggregation configuration should only be performed by personnel who are knowledgeable about Spanning Tree and Link Aggregation, and fully understand the ramifications of modifications beyond device defaults. Otherwise, the proper operation of the network could be at risk.

4.3.10.1 Matrix E1 Trunk and LAG Usage Considerations

When configuring port trunking and 802.3ad link aggregation on Matrix E1 devices, it is important consider the following factors:

- Ports can only be assigned to one trunk or Link Aggregation Group (LAG).
- Fast Ethernet ports in a trunk or LAG must belong to the same port group. For details on port grouping designations, refer to Section 4.3.10.2.
- Ports in a trunk or LAG must be of the same port type. Fast Ethernet and Gigabit ports cannot be combined into a trunk.
- Only one trunk or LAG can be configured per port group.
- The ports at both ends of a connection must be enabled and identically configured as trunk or LAG ports.
- The ports at both ends of a trunk or LAG must be configured in an identical manner, including speed, duplex mode, and VLAN assignments.

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- None of the ports in a trunk or LAG should be configured as a mirror source port or mirror target port. If a port with an active LACP link is configured as a mirror source or target port, the LACP link will be brought down. Note that all eight ports in the same port group are affected—once one port in the group is mirrored, any other LACP ports in the same group will be removed from the trunk.
- All the ports in a trunk or LAG have to be treated as a whole when moved from/to, added or deleted from a VLAN.
- The Spanning Tree Algorithm will treat all the ports in a trunk or LAG as a whole.
- The Spanning Tree state of a trunk or LAG will be the Spanning Tree state of the lowest numbered port. All other member ports will assume a Spanning Tree state of disabled.
- Before removing a static port trunk via CLI commands, you must remove all network cables. Otherwise, a loop may be created.
- To disable a single link within a port trunk, you should first remove the network cable, and then disable both ends of the link. This allows the traffic passing across that link to be automatically distributed to the other links in that trunk, without losing any significant amount of traffic.

4.3.10.2 Port Grouping Considerations

Important Notice

The port grouping designations detailed below apply only to the Matrix E1 1H582-51 and 1H582-25 models, as well as the 1H-16TX and the 1H-8FX expansion modules.

When configuring the Matrix E1 for link aggregation, it is important to understand how ports are grouped in the device's fixed front panel and optional expansion module(s). All ports in a trunk or a link aggregation group (LAG) must belong to the same port group. Port groupings are designated as follows:

- The fixed front panel in the 1H582-51 has six groups of eight ports, as shown in Figure 4-3 and Table 4-5.
- The fixed front panel in the 1H582-25 has three groups of eight ports, as shown in Figure 4-4 and Table 4-5.
- Depending on the module(s) installed, optional expansion modules have two groups of up to eight ports, as shown in Figure 4-3 and Figure 4-4. When the 1H-16TX expansion module is installed, it provides 16 RJ45 ports which belong to two port groups, as shown in Table 4-6.

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NOTE: This port grouping limitation does not apply to the Matrix E1 1G582-09 model or Gigabit Ethernet expansion modules.

Figure 4-3 Port Grouping Designations for the Matrix E1 1H582-51

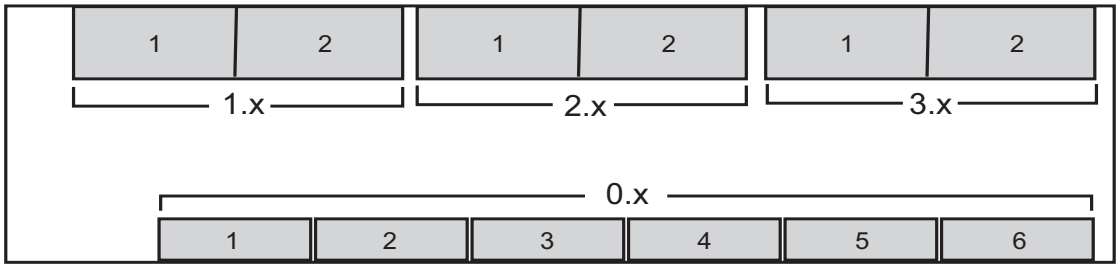

Figure 4-4 Port Grouping Designations for the Matrix E1 1H582-25

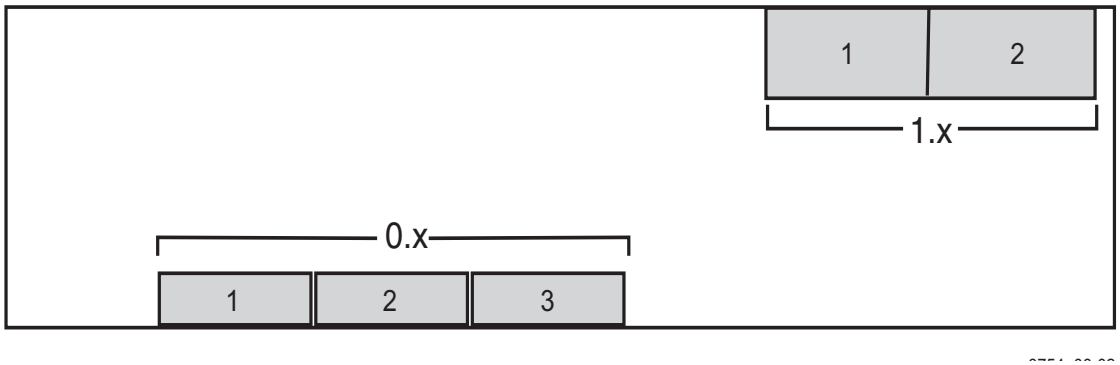

Table 4-5 Port Grouping IDs for the Matrix E1 1H582-xx Fixed Front Panel

Fixed Front Panel Slot Location	**0**					
1H582-51 Group IDs	**1**	**2**	**3**	**4**	**5**	**6**
Ports	1 thru 8	9 thru 16	17 thru 24	25 thru 32	33 thru 40	41 thru 48
1H582-25 Group IDs	**1**	**2**	**3**			
Ports	1 thru 8	9 thru 16	17 thru 24			

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Table 4-6 Port Grouping IDs for the 1H-16TX and 1H-8FX Expansion Modules

Expansion Module Slot Location	1, 2 or 3	
1H-16TX Group IDs	1	2
Ports	1 thru 8	9 thru 16
1H-8FX Group IDs	1	
Ports	1 thru 8	

For details on how to specify port designation in the CLI syntax, refer to Section 4.1.2.

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4.3.11 Configuring Static Port Trunking

The Matrix E1 allows you to configure up to 12 trunks on the device. Depending on the Matrix E1 model type and the expansion module(s) installed, each trunk can combine up to eight ports into an aggregate connection with up to 8 Gbps of bandwidth when operating at full duplex. Besides balancing the load across each port in the trunk, the additional ports provide redundancy by taking over the load if another port in the trunk should fail. However, before making any physical connections between devices, use the **set trunk** command to specify the trunk on the devices at both ends.

Purpose

To display trunking information, to set the device trunking mode, to create and delete trunks on the device, to display and configure port settings for a particular trunk, and to set the trunking algorithm.

Commands

The commands needed to configure port trunking are listed below and described in the associated section as shown.

- show trunk (Section 4.3.11.1)
- set trunkmode (Section 4.3.11.2)
- set trunk (Section 4.3.11.3)
- clear trunk (Section 4.3.11.4)
- set trunk port (Section 4.3.11.5)
- clear trunk port (Section 4.3.11.6)
- set trunk algorithm (Section 4.3.11.7)

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4.3.11.1 show trunk

Use this command to display trunking information for the device. Output will vary depending on the link aggregation mode of the device, as shown in the examples below.

show trunk [*trunk_name*]

Syntax Description

trunk_name	(Optional, portTrunking mode only) Displays trunking information for a specific trunk.

Command Defaults

If *trunk_name* is not specified, information for all trunks will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display trunking information when the device is in 802.3ad mode:

```
Matrix>show trunk
Device is in 802.3AD mode.
 Trunking algorithm is round robin.
 LACP Rx/Tx is globally enabled.
 System Identifier: 00:01:f4:c5:f7:f0
  Agg     OKey  ports
 ------------------------------------------------------------
 lag.0.1  100   fe.0.1 fe.0.2 fe.0.3 fe.0.4
Slag.0.2  100   None
 lag.0.3  100   None
 lag.1.1   11   None
 lag.1.2   12   None
 lag.2.1  100   None
```


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This example shows how to display trunking information when the device is in port trunking mode:

```
Matrix>show trunk
Device is in portTrunking mode.
Trunking algorithm is round robin.
trunkName: newtrunk1 Admin Status: enabled Oper Status: up
trunkName: trunk2 Admin Status: disabled Oper Status: down
```

This example shows how to display trunking information for trunk2 when the device is in port trunking mode:

```
Matrix>show trunk trunk2
trunk port: fe.0.10
trunk port fe.0.11
trunk port fe.0.12
```

Table 4-7 provides an explanation of the command output.

Table 4-7 show trunk Output Details

Output	What It Displays...
Device is in...	Trunking mode of the device. Default of 802.3ad can be changed using the **set trunkmode** command (Section 4.3.11.2).
Trunking algorithm is...	Whether the trunking algorithm is round robin (default) or MAC hashing. Default can be changed using the **set trunk algorithm** command (Section 4.3.11.7).
trunkName	Name and status of trunk(s) configured in port trunking mode.
LACP Rx/Tx	(Displayed in 802.3ad mode only.) Whether LACP is enabled or disabled. Default (enabled) can be changed using the **set lacp** command (Section 4.3.13.1).
System Identifier	(Displayed in 802.3ad mode only.) Device MAC address.
Agg	(Displayed in 802.3ad mode only.) Link Aggregation Group designations. Statically formed LAGs are indicated with an “S” preceding the aggregator name.

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Table 4-7 show trunk Output Details (Continued)

Output	What It Displays...
OKey	(Displayed in 802.3ad mode only.) Operational key, which determines underlying physical ports' ability to aggregate. For more details, refer to Section 4.3.13.2.
ports	(Displayed in 802.3ad mode only.) Physical ports belonging to the LAG.

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4.3.11.2 set trunkmode

Use this command to toggle the trunking mode on the device from the default (802.3ad) to port trunking, which allows the device to recognize statically created port trunks.

set trunkmode {**8023ad** | **porttrunking**}

Syntax Description

8023ad	Enables 802.3ad link aggregation mode.
porttrunking	Enables manual port trunking mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how enable port trunking mode on the device:

```
Matrix>set trunkmode porttrunking
```

4.3.11.3 set trunk

Use this command to create, enable or disable a trunk when the device is set to port trunking mode.

set trunk *trunk_name* {**create** | **disable** | **enable**}

Syntax Description

trunk_name	Specifies the name of the trunk port to be created, disabled or enabled.
create | **disable** | **enable**	Creates, disables or enables a trunk with the specified name.

Command Defaults

None.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to create a trunk named “blue”:

```
Matrix>set trunk blue create
```

4.3.11.4 clear trunk
Use this command to delete a trunk when the device is set to port trunking mode.

clear trunk *trunk_name*

Syntax Description

trunk_name	Specifies the name of the trunk to be deleted.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to delete the “green” trunk from the device:

```
Matrix>clear trunk green
```


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4.3.11.5 set trunk port

Use this command to add one or more trunk ports to an existing trunk when the device is set to port trunking mode.

set trunk port *trunk_name port-string*

Syntax Description

trunk_name	Specifies the name of the trunk to which the trunk port will be added.
port-string	Specifies the designation of the port(s) to be added to the trunk. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add Fast Ethernet front panel ports 3 through 6 to the “blue” trunk:

```
Matrix>set trunk port blue fe.0.3-6
```

4.3.11.6 clear trunk port

Use this command to remove a port from a trunk when the device is set to port trunking mode.

clear trunk port *trunk_name port-string*

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Syntax Description

trunk_name	Specifies the name of the trunk from which the port will be removed.
port-string	Specifies the designation of the port to be removed from the trunk. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete Fast Ethernet front panel ports 5 through 7 from the "blue" trunk:

```
Matrix>clear trunk port blue fe.0.5-7
```

4.3.11.7 set trunk algorithm

Sets the algorithm that will be used to distribution MAC addresses across a trunk group as they are learned on the device.

set trunk algorithm {**machashing** | **roundrobin**}

Syntax Description

machashing	Applies the MAC hashing algorithm.
roundrobin	Applies round robin distribution of MAC addresses.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set the device's trunk algorithm to MAC hashing:

```
Matrix>set trunk algorithm machashing
```


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4.3.12 Link Aggregation Control Protocol (LACP)

CAUTION: Link aggregation configuration should only be performed by personnel who are knowledgeable about Spanning Tree and Link Aggregation, and fully understand the ramifications of modifications beyond device defaults. Otherwise, the proper operation of the network could be at risk.

Using multiple links simultaneously to increase bandwidth is a desirable switch feature, which can be accomplished if both sides agree on a set of ports that are being used as a Link Aggregation Group (LAG). Once a LAG is formed from selected ports, problems with looping can be avoided since the Spanning Tree can treat this LAG as a single port.

The Link Aggregation Control Protocol (LACP) logically groups interfaces together to create a greater bandwidth uplink, or link aggregation, according to the IEEE 802.3ad standard. This standard allows the switch to determine which ports are in LAGs and configure them dynamically. Since the protocol is based on the IEEE 802.3ad specification, any switch from any vendor that supports this standard can aggregate links automatically.

802.3ad LACP aggregations can also be run to end-users (ie; a server) or to a router.

4.3.12.1 LACP Operation

For each aggregatable port in the device, LACP:

- Maintains configuration information (reflecting the inherent properties of the individual links as well as those established by management) to control aggregation.
- Exchanges configuration information with other devices to allocate the link to a Link Aggregation Group (LAG).

NOTE: A given link is allocated to, at most, one Link Aggregation Group (LAG) at a time. The allocation mechanism attempts to maximize aggregation, subject to management controls.

- Attaches the port to the aggregator used by the LAG, and detaches the port from the aggregator when it is no longer used by the LAG.
- Uses information from the partner device's link aggregation control entity to decide whether to aggregate ports.

The operation of LACP involves the following activities:

- Checking that candidate links can actually be aggregated.

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- Controlling the addition of a link to a LAG, and the creation of the group if necessary.
- Monitoring the status of aggregated links to ensure that the aggregation is still valid.
- Removing a link from a LAG if its membership is no longer valid, and removing the group if it no longer has any member links.

In order to allow LACP to determine whether a set of links connect to the same device, and to determine whether those links are compatible from the point of view of aggregation, it is necessary to be able to establish:

- A globally unique identifier for each device that participates in link aggregation.
- A means of identifying the set of capabilities associated with each port and with each aggregator, as understood by a given device.
- A means of identifying a LAG and its associated aggregator.

4.3.12.2 LACP Terminology

Table 4-8 defines key terminology used in LACP configuration.

Table 4-8 LACP Terms and Definitions

Term	Definition
Aggregator	A virtual port that controls link aggregation for underlying physical ports. Depending on the model and expansion modules installed, each Matrix E1 device can provide up to 12 aggregator ports, which are designated in the CLI as **lag.x.y**, where x is the slot location and y is the port number. For a description of how to designate slot location and port numbering, refer to Section 4.1.2.
LAG	Link Aggregation Group. Once underlying physical ports (i.e., **fe.x.x**, or **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.x.y** port designation.
LACPDU	Link Aggregation Control Protocol Data Unit. The protocol exchanges aggregation state/mode information by way of a port's actor and partner operational states. LACPDUs sent by the first party (the actor) convey to the second party (the actor's protocol partner) what the actor knows, both about its own state and that of its partner.

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Table 4-8 LACP Terms and Definitions (Continued)

Term	Definition
Actor and Partner	An actor is the local device sending LACPDUs. Its protocol partner is the device on the other end of the link aggregation. Each maintains current status of the other via LACPDUs containing information about their ports' LACP status and operational state.
Admin Key	Value assigned to aggregator ports and physical ports that are candidates for joining a LAG. The LACP implementation on Matrix E1 devices will use this value to form an oper key and will determine which underlying physical ports are capable of aggregating by comparing oper keys. Aggregator ports allow only underlying ports with oper keys matching theirs to join their LAG.
System Priority	Value used to build a LAG ID, which determines aggregation precedence. If there are two partner devices competing for the same aggregator, LACP compares the LAG IDs for each grouping of ports. The LAG with the lower LAG ID is given precedence and will be allowed to use the aggregator.

4.3.12.3 Matrix E1 LAG Usage Considerations

In normal usage (and typical implementations) there is no need to modify any of the default LACP parameters on the Matrix E1 device. The default values will result in the maximum number of aggregations possible. If the switch is placed in a configuration with its peers not running the protocol, no dynamic link aggregations will be formed and the switch will function normally (that is, will block redundant paths). For information about building static aggregations, refer to **set lacp static** (Section 4.3.13.2).

Depending on the model and expansion modules installed, each Matrix E1 device can provide up to 12 aggregator ports, which are designated in the CLI as **lag.x.y.** Once underlying physical ports (i.e.; **fe.x.x**, or **ge.x.x**) are associated with an aggregator port, the resulting aggregation will be represented as one LAG with a **lag.x.y** port designation. LACP determines which underlying physical ports are capable of aggregating by comparing operational keys. Aggregator ports allow only underlying ports with keys matching theirs to join their LAG.

There are a few cases in which ports will not aggregate:

- An underlying physical port is attached to another port on this same switch (loopback).

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- Ethernet ports do not belong to the same port group. As described in Section 4.3.10.1, only one LAG is allowed per Ethernet port group.
- There is no available aggregator for two or more ports with the same LAG ID. This can happen if there are simply no available aggregators, or if none of the aggregators have a matching admin key and system priority.
- 802.1x authentication is enabled using the **set eapol** command (Section 14.3.2.8) and ports that would otherwise aggregate are not 802.1X authorized.
- MAC locking is enabled on the ports as described in Section 14.3.4.

NOTE: To aggregate, underlying physical ports must be running in full duplex mode and must be of the same operating speed.

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4.3.13 Configuring Link Aggregation

Purpose

To disable and re-enable the Link Aggregation Control Protocol (LACP), to display and configure LACP settings for one or more aggregator ports, and to display and configure the LACP settings for underlying physical ports that are potential members of a link aggregation.

NOTE: Commands with the keyword lacp can only be used when the device is in 802.3ad mode. This mode can be reset using the **set trunkmode** command as described in Section 4.3.11.2.

Commands

The commands used to review and configure LACP are listed below and described in the associated section as shown.

- set lacp (Section 4.3.13.1)
- set lacp static (Section 4.3.13.2)
- clear lacp static (Section 4.3.13.3)
- show port lacp (Section 4.3.13.4)
- set port lacp (Section 4.3.13.5)

4.3.13.1 set lacp

Use this command to disable or enable the Link Aggregation Control Protocol (LACP) on the device.

set lacp {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables LACP.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to disable LACP:

```
Matrix>set lacp disable
```

4.3.13.2 set lacp static

Use this command to assign one or more underlying physical ports to a Link Aggregation Group (LAG). This provides the ability to hard code LAG trunks, similar to forming trunks while the device is in port trunking mode.

NOTES: At least two ports need to be assigned to a LAG port for a Link Aggregation Group to form and attach to the specified LAG port.

Usage considerations discussed in Section 4.3.10.1 apply to statically created LAGs.

Ports and aggregators that are not statically assigned can still form trunks dynamically. A port that is not statically assigned can never join an aggregator that has ports statically assigned to it.

Static LAG configuration should be performed by personnel who are knowledgeable about Link Aggregation. Misconfiguration can result in LAGs not being formed, or in ports attaching to the wrong LAG port, affecting proper network operation.

set lacp static *lagportstring port-string*

Syntax Description

lagportstring	Specifies the LAG aggregator port to which new ports will be assigned.
port-string	Specifies the member port(s) to add to the LAG. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to add Fast Ethernet front panel ports 1 through 4 to the LAG of aggregator port 1. As noted above, other ports cannot attach to lag.0.1 until this static LAG is cleared:

```
Matrix>set lacp static lag.0.1 fe.0.1-4
```

4.3.13.3 clear lacp static

Use this command to remove specific ports from a Link Aggregation Group.

clear lacp static *lagportstring port-string*

Syntax Description

lagportstring	Specifies the LAG aggregator port from which ports will be removed.
port-string	Specifies the port(s) to remove from the LAG. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove Fast Ethernet front panel port 6 from a static assignment:

```
Matrix>clear lacp static lag.0.1 fe.0.6
```


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4.3.13.4 show port lacp

Use this command to display link aggregation information for one or more underlying physical ports.

show port lacp {[*port-string*] [**counters** *port-string*] [**detail** *port-string*]}

Syntax Description

port-string	Displays LACP information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
counters *port-string*	Displays LACP counter information for one or more ports.
detail *port-string*	Displays detailed LACP status information for one or more ports.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display LACP status information for all Gigabit Ethernet ports. In this case, ports ge.0.1 and ge.0.2 have been statically assigned to an aggregator (lag.0.1), but not attached, as indicated by the asterisks placed in the aggregator names:

```
Matrix>show port lacp ge.0.*
  Port    Key     State       Agg         POSysID          POKey   LACPRxTx
 ------------------------------------------------------------------------
 ge.0.1   100   -F---AlA    l*g.0.1   00:00:00:00:00:00      1     Disabled
 ge.0.2   100   -F---AlA    l*g.0.1   00:00:00:00:00:00      1     Disabled
 ge.0.3   100   -F--SAlA    -------   00:00:00:00:00:00      3     Enabled
 ge.0.4   100   -F--SAlA    -------   00:00:00:00:00:00      4     Enabled
 ge.0.5   100   -F--SAlA    -------   00:00:00:00:00:00      5     Enabled
 ge.0.6   100   -FDCSAlA    -------   00:00:00:00:00:00      6     Enabled
```


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NOTES: State definitions, such as ActorAdminState and Partner AdminState, are indicated with letter abbreviations. If the **show port lacp** command displays one or more of the following letters, it means the state is true for the associated actor or partner ports:

E = Expired; **F** = Defaulted; **D** = Distributing (tx enabled); **C** = Collecting (rx enabled); **S** = Synchronized (attached to appropriate aggregator); **A/i** = Aggregable/individual port; **S/l** = Short/Long LACP timeout; **A/p** = Active/Passive LACP.

For more information about these states, refer to **set port lacp** (Section 4.3.13.5) and the IEEE 802.3 2002 specification.

This example shows how to display LACP counters for all Fast Ethernet front panel ports:

```
Matrix>show port lacp counters fe.0.*

 Port        LACPTx    LACPRx   TLastRx   MrkTx    MrkRx    LACPErr
 ------------------------------------------------------------------------
 fe.0.1         23        20      22.84s     0        0        0
 fe.0.2          7         4       12m       0        0        0
 fe.0.3          0         0       n/a       0        0        0
```

This example shows how to display detailed LACP information for Fast Ethernet front panel port 1:

```
Matrix>show port lacp detail fe.0.1
LACP Details for Port: fe.0.1

LAG ID: [(0001,00001dfffefd,0001,00,0000),(0001,00e063a3e0ce,0001,00,0000)]
ActorOperKey:                   1 AttachedAggID:                    lag.0.1
ActorAdminState:                5 ActorOperState:           0x3d --DCSAlA
PartnerAdminKey:                1 PartnerOperState:         0x3d --DCSAlA
PartnerOperKey:                 1 PartnerOperSystemID:  00:e0:63:a3:e0:ce
RxState:                 Current MuxState:                      Distrib
MuxReason: SELECTED & PSync & PColl
```


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4.3.13.5 set port lacp

Use this command to set link aggregation parameters for one or more ports. These settings will determine the specified underlying physical ports' ability to join a LAG, and their administrative state once aggregated.

set port lacp {[**aadminstate** *port-string state*] [**padminkey** *port-string*{*value* | **default**}] [**enable** | **disable**] *port-string*}

Syntax Description

aadminstate *port-string state*	Sets one or more port's active/passive, timeout, and aggregable status. Valid entries and their corresponding actions are: • **active** - Enables active LACP operation. • **aggregable** - Enables aggregations on this port. • **default** - Enables default values (active, long-timeout, aggregable). • **inaggregable** - Disables aggregations on this port. • long-timeout - Enables a long LACP time out (30 seconds). • **passive** - Enables passive LACP operation. • **short-timeout** - Enables a short LACP timeout (3 seconds).
padminkey *port-string value* | **default**	Sets one or more port's partner admin key. In the absence of LACPDU's, LACP will use this value as the partner operational key value in the port's LAG ID. Ports with the same LAG ID will attempt to aggregate if other system conditions favor aggregation. Valid values are **1** - **65535** or **default**, which clears matching admin keys.
enable | **disable** *port-string*	Enables or disables LACPDU processing on one or more ports.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Examples

This example shows how to place ports ge.0.1 and ge.0.2 in the same LAG by assigning both padminkey 1:

```
Matrix>set port lacp padminkey ge.0.1 1
Matrix>set port lacp padminkey ge.0.2 1
```

This example shows how to clear the LAG created:

```
Matrix>set port lacp padminkey ge.0.* default
```

This example shows how to disable LACP processing on all Gigabit Ethernet front panel ports:

```
Matrix>set port lacp disable ge.0.*
```


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4.3.14 Configuring Port Broadcast Suppression

Purpose

To display, disable or set the broadcast thresholds on a per-port basis. This limits the amount of received broadcast frames that the specified port will be allowed to switch out to other ports. Broadcast suppression protects against broadcast storms, leaving more bandwidth available for critical data.

Commands

The commands needed to configure port broadcast suppression are listed below and described in the associated section as shown.

- show port broadcast (Section 4.3.14.1)
- set port broadcast (Section 4.3.14.2)

4.3.14.1 show port broadcast

Use this command to display port broadcast suppression information for one or more ports.

show port broadcast [*port-string*]

Syntax Description

port-string	(Optional) Displays broadcast status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, broadcast status of all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display broadcast information for Fast Ethernet front panel port 1, where broadcast suppression is enabled and set to 500 packets per second (pps):

```
Matrix>show port broadcast fe.0.1
 Broadcast Suppression enabled for port fe.0.1 at 500 pps
```

4.3.14.2 set port broadcast

Use this command to set the broadcast suppression limit in packets per second on one or more ports. This sets a threshold on the broadcast traffic that is received and switched out to other ports.

set port broadcast *port-string packet_count* [**disable** | **enable**]

Syntax Description

port-string	Specifies the port(s) for which to enable or disable broadcast suppression. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
packet_count	Specifies the packets per second threshold on broadcast traffic. Maximum value is 1488100 for Gigabit and 148810 for Fast Ethernet.
disable | **enable**	(Optional) Disables or enables broadcast suppression.

Command Defaults

If **enable** or **disable** is not specified, port broadcast *packet_count* will be set on specified ports where broadcast suppression is enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to enable broadcast suppression to 800 packets per second on Fast Ethernet front panel ports 10 through 13:

```
Matrix>set port broadcast fe.0.10-13 800 enable
```


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This example shows how to set broadcast suppression to 2000 packets per second on Fast Ethernet front panel ports 10 through 13:

```
Matrix>set port broadcast fe.0.10-13 2000
```


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4.3.15 Configuring Unknown Destination Address Suppression

Purpose

To display, enable or disable the unknown destination address suppression function on one or more ports. When enabled, this function prevents unknown unicast traffic from being transmitted out ports. It is intended for "static" configurations where all MAC addresses are known within the system and excess "flooding" of unlearned unicast traffic is not desired.

CAUTION: Improper use of these commands may result in network connectivity issues.

Commands

The commands needed to configure unknown destination address suppression are listed below and described in the associated section as shown.

- show port unknowndestsuppress (Section 4.3.15.1)
- set port unknowndestsuppress (Section 4.3.15.2)
- clear port unknowndestsuppress (Section 4.3.15.3)

4.3.15.1 show port unknowndestsuppress

Use this command to display the status of unknown unicast traffic suppression on one or more ports.

show port unknowndestsuppress [*port-string*]

Syntax Description

port-string	(Optional) Displays status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status of all ports will be displayed.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display the status of unknown unicast traffic suppression on Fast Ethernet front panel port 1. In this case, the default state of disabled has not been changed:

```
Matrix>show port unknowndestsuppress fe.0.1
 Unknown Destination Forwarding Status
  Port:    Status:
====================
 fe.0.1    Disabled
```

4.3.15.2 set port unknowndestsuppress

Use this command to enable or disable the suppression of unknown unicast traffic transmission from one or more ports.

set port unknowndestsuppress *port-string* [**enable** | **disable**]

Syntax Description

port-string	Specifies port(s) on which to enable or disable suppression. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	(Optional) Enables or disables suppression.

Command Defaults

If **disable** is not specified, suppression will be enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable unknown destintation address suppression on Fast Ethernet front panel port 1:

```
Matrix>set port unknowndestsuppress fe.0.1
```


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4.3.15.3 clear port unknowndestsuppress

Use this command to reset the suppression of unknown unicast traffic transmission from one or more ports to the default state of disabled.

clear port unknowndestsuppress [*port-string*]

Syntax Description

port-string	(Optional) Resets status for specific port(s).For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status of all ports will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset unknown destintation address suppression on Fast Ethernet front panel port 1 to disabled:

```
Matrix>clear port unknowndestsuppress fe.0.1
```


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5

SNMP Configuration

This chapter describes the Simple Network Management Protocol (SNMP) set of commands and how to use them.

5.1 SNMP CONFIGURATION SUMMARY

SNMP is an application-layer protocol that facilitates the exchange of management information between network devices. SNMP enables network administrators to manage network performance, find and solve network problems, and plan for network growth.

Matrix E1 Series devices support three versions of SNMP:

- Version 1 (SNMPv1) — This is the initial implementation of SNMP. Refer to RFC 1157 for a full description of functionality.
- Version 2 (SNMPv2) — The second release of SNMP, described in RFC 1907, has additions and enhancements to data types, counter size, and protocol operations.
- Version 3 (SNMPv3) — This is the most recent version of SNMP, and includes significant enhancements to administration and security. SNMPv3 is fully described in RFC 2571, RFC 2572, RFC 2573, RFC 2574, and RFC 2575.

5.1.1 SNMPv1 and SNMPv2

The components of SNMPv1 and SNMPv2 network management fall into three categories:

- Managed devices (such as a switch).
- SNMP agents and MIBs, including SNMP traps, community strings, and Remote Monitoring (RMON) MIBs, which run on managed devices.
- SNMP network management applications, such as Enterasys Networks' NetSight Atlas, which communicate with agents to get statistics and alerts from the managed devices.

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5.1.2 SNMPv3

SNMPv3 is an interoperable standards-based protocol that provides secure access to devices by authenticating and encrypting frames over the network. The advanced security features provided in SNMPv3 are as follows:

- Message integrity — Collects data securely without being tampered with or corrupted.
- Authentication — Determines the message is from a valid source.
- Encryption — Scrambles the contents of a frame to prevent it from being seen by an unauthorized source.

Unlike SNMPv1 and SNMPv2, in SNMPv3, the concept of SNMP agents and SNMP managers no longer applies. These concepts have been combined into an SNMP entity. An SNMP entity consists of an SNMP engine and SNMP applications. An SNMP engine consists of the following four components:

- Dispatcher — This component sends and receives messages.
- Message processing subsystem — This component accepts outgoing PDUs from the dispatcher and prepares them for transmission by wrapping them in a message header and returning them to the dispatcher. The message processing subsystem also accepts incoming messages from the dispatcher, processes each message header, and returns the enclosed PDU to the dispatcher.
- Security subsystem — This component authenticates and encrypts messages.
- Access control subsystem — This component determines which users and which operations are allowed access to managed objects.

5.1.3 About SNMP Security Models and Levels

An SNMP security model is an authentication strategy that is set up for a user and the group in which the user resides. A security level is the permitted level of security within a security model. The three levels of SNMP security are: No authentication required (NoAuthNoPriv); authentication required (AuthNoPriv); and privacy (authPriv). A combination of a security model and a security level determines which security mechanism is employed when handling an SNMP frame. Table 5-1 identifies the levels of SNMP security available on Matrix E1 Series devices and authentication required within each model.

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Table 5-1 SNMP Security Levels

Model	Security Level	Authentication	Encryption	How It Works
v1	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.
v2	NoAuthNoPriv	Community string	None	Uses a community string match for authentication.
v3	NoAuthNoPriv	User name	None	Uses a user name match for authentication.
	AuthNoPriv	MD5	None	Provides authentication based on the HMAC-MD5 algorithm.
	authPriv	MD5	DES	Provides authentication based on the HMAC-MD5 algorithm. Provides DES 56-bit encryption in addition to authentication based on the CBC-DES (DES-56) standard.

5.1.4 Process Overview: SNMP Configuration

NOTE: Commands for configuring SNMP on the Matrix E1 Series device are independent during the SNMP setup process. For instance, target parameters can be specified when setting up optional notification filters — even though these parameters have not yet been created with the **set snmp targetparams** command. The following steps are a guideline to configuring SNMP and do not necessarily need to be executed in this order.

Use the following steps as a guide to configuring SNMP on the device:

1. Disabling / enabling and reviewing SNMP statistics (Section 5.2.1)
2. Configuring SNMP users, groups and communities (Section 5.2.2)
3. Configuring SNMP access rights (Section 5.2.3)
4. Configuring SNMP MIB views (Section 5.2.4)
5. Configuring SNMP target parameters (Section 5.2.5)

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6. Configuring SNMP target addresses (Section 5.2.6)
7. Configuring SNMP notification parameters (Section 5.2.7)
8. Configuring a basic SNMP trap notification (Section 5.2.8)

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5.2 SNMP COMMAND SET

5.2.1 Disabling / Enabling and Reviewing SNMP Statistics

Purpose

To disable, re-enable SNMP and to review SNMP statistics.

Commands

The commands needed to disable or enable SNMP and review SNMP statistics are listed below and described in the associated section as shown.

- show snmp (Section 5.2.1.1)
- set snmp (Section 5.2.1.2)
- show snmp engineid (Section 5.2.1.3)
- show snmp counters (Section 5.2.1.4)

5.2.1.1 show snmp

Use this command to display the status of SNMP management on the device. By default, it is enabled at device startup.

show snmp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example
This example shows how to display SNMP status:

```
Matrix>show snmp
SNMP is currently enabled.
```

5.2.1.2 set snmp
Use this command to enable or disable SNMP management on the device.

set snmp {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables SNMP management.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to disable SNMP:

```
Matrix>set snmp disable
```

5.2.1.3 show snmp engineid
Use this command to display the SNMP local engine ID. This is the SNMP v3 engine's administratively unique identifier.

show snmp engineid

Syntax Description
None.

Command Defaults
None.

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Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP engine properties:

```
Matrix>show snmp engineid
EngineId: 80:00:15:f8:03:00:e0:63:9d:b5:87
Engine Boots    = 12
Engine Time     = 162181
Max Msg Size    = 2048
```

Table 5-2 shows a detailed explanation of the command output.

Table 5-2 show snmp engineid Output Details

Output	What It Displays...
EngineId	String identifying the SNMP agent on the device.
Engine Boots	Number of times the SNMP engine has been started or reinitialized.
Engine Time	Time in seconds since last reboot.
Max Msg Size	Maximum accepted length, in bytes, of SNMP frame.

5.2.1.4 show snmp counters

Use this command to display SNMP traffic counter values.

show snmp counters

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SNMP counter values

```
Matrix>show snmp counters

--- mib2 SNMP group counters:
snmpInPkts              = 396601
snmpOutPkts             = 396601
snmpInBadVersions       = 0
snmpInBadCommunityNames = 0
snmpInBadCommunityUses  = 0
snmpInASNParseErrs      = 0
snmpInTooBigs           = 0
snmpInNoSuchNames       = 0
snmpInBadValues         = 0
snmpInReadOnlys         = 0
snmpInGenErrs           = 0
snmpInTotalReqVars      = 403661
snmpInTotalSetVars      = 534
snmpInGetRequests       = 290
snmpInGetNexts          = 396279
snmpInSetRequests       = 32
snmpInGetResponses      = 0
snmpInTraps             = 0
snmpOutTooBigs          = 0
snmpOutNoSuchNames      = 11
snmpOutBadValues        = 0
snmpOutGenErrs          = 0
snmpOutGetRequests      = 0
snmpOutGetNexts         = 0
snmpOutSetRequests      = 0
snmpOutGetResponses     = 396601
snmpOutTraps            = 0
snmpSilentDrops         = 0
snmpProxyDrops          = 0

--- v3 Stats counters:
usmStatsUnsupportedSecLevels = 0
usmStatsNotInTimeWindows     = 0
usmStatsUnknownUserNames     = 0
usmStatsUnknownEngineIDs     = 0
usmStatsWrongDigests         = 0
usmStatsDecryptionErrors     = 0
```

Table 5-3 shows a detailed explanation of the command output.

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Table 5-3 show snmp counters Output Details

Output	What It Displays...
snmpInPkts	Number of messages delivered to the SNMP entity from the transport service.
snmpOutPkts	Number of SNMP messages passed from the SNMP protocol entity to the transport service.
snmpInBadVersions	Number of SNMP messages delivered to the SNMP entity for an unsupported SNMP version.
snmpInBadCommunityNames	Number of SNMP messages delivered to the SNMP entity that used an SNMP community name not known to the entity.
snmpInBadCommunityUses	Number of SNMP messages delivered to the SNMP entity that represented an SNMP operation not allowed by the SNMP community named in the message.
snmpInASNParseErrs	Number of ASN.1 (Abstract Syntax Notation) or BER (Basic Encoding Rules) errors encountered by the SNMP entity when decoding received SNMP messages.
snmpInTooBigs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "tooBig."
snmpInNoSuchNames	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "noSuchName."
snmpInBadValues	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "badValue."
snmpInReadOnlys	Number of valid SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "readOnly."
snmpInGenErrs	Number of SNMP PDUs delivered to the SNMP protocol entity with the value of the error-status field as "genErr."

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Table 5-3 show snmp counters Output Details (Continued)

Output	What It Displays...
snmpInTotalReqVars	Number of MIB objects retrieved successfully by the SNMP protocol entity as the result of receiving valid SNMP Get-Request and Get-Next PDUs.
snmpInTotalSetVars	Number of MIB objects altered successfully by the SNMP protocol entity as the result of receiving valid SNMP Set-Request PDUs.
snmpInGetRequests	Number of SNMP Get-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetNexts	Number of SNMP Get-Next PDUs accepted and processed by the SNMP protocol entity.
snmpInSetRequests	Number of SNMP Set-Request PDUs accepted and processed by the SNMP protocol entity.
snmpInGetResponses	Number of SNMP Get-Response PDUs accepted and processed by the SNMP protocol entity.
snmpInTraps	Number of SNMP Trap PDUs accepted and processed by the SNMP protocol entity.
snmpOutTooBigs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "tooBig."
snmpOutNoSuchNames	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status as "noSuchName."
snmpOutBadValues	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "badValue."
snmpOutGenErrs	Number of SNMP PDUs generated by the SNMP protocol entity with the value of the error-status field as "genErr."
snmpOutGetRequests	Number of SNMP Get-Request PDUs generated by the SNMP protocol entity.

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Table 5-3 show snmp counters Output Details (Continued)

Output	What It Displays...
snmpOutGetNexts	Number of SNMP Get-Next PDUs generated by the SNMP protocol entity.
snmpOutSetRequests	Number of SNMP Set-Request PDUs generated by the SNMP protocol entity.
snmpOutGetResponses	Number of SNMP Get-Response PDUs generated by the SNMP protocol entity.
snmpOutTraps	Number of SNMP Trap PDUs generated by the SNMP protocol entity.
snmpSilentDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the requestor's maximum message size.
snmpProxyDrops	Number of SNMP Get, Set, or Inform request error messages that were dropped because the reply was larger than the proxy target's maximum message size.
usmStatsUnsupportedSecLevels	Number of packets received by the SNMP engine that were dropped because they requested a security level that was unknown to the SNMP engine or otherwise unavailable.
usmStatsNotInTimeWindows	Number of packets received by the SNMP engine that were dropped because they appeared outside of the authoritative SNMP engine's window.
usmStatsUnknownUserNames	Number of packets received by the SNMP engine that were dropped because they referenced a user that was not known to the SNMP engine.
usmStatsUnknownEngineIDs	Number of packets received by the SNMP engine that were dropped because they referenced an snmpEngineID that was not known to the SNMP engine.

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Table 5-3 show snmp counters Output Details (Continued)

Output	What It Displays...
usmStatsWrongDigests	Number of packets received by the SNMP engine that were dropped because they did not contain the expected digest value.
usmStatsDecriptionErrors	Number of packets received by the SNMP engine that were dropped because they could not be decrypted.

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5.2.2 Configuring SNMP Users, Groups and Communities

Purpose

To review and configure SNMP users, groups and communities. These are defined as follows:

- User — A person registered in SNMPv3 to access SNMP management.
- Group — A collection of users who share the same SNMP access privileges.
- Community — A name used to authenticate SNMPv1 and v2 users.

Commands

The commands needed to review and configure SNMP users, groups and communities are listed below and described in the associated section as shown.

- show snmp user (Section 5.2.2.1)
- set snmp user (Section 5.2.2.2)
- clear snmp user (Section 5.2.2.3)
- show snmp group (Section 5.2.2.4)
- set snmp group (Section 5.2.2.5)
- clear snmp group (Section 5.2.2.6)
- show community (Section 5.2.2.7)
- set community (Section 5.2.2.8)
- clear community (Section 5.2.2.9)
- show snmp community (Section 5.2.2.10)
- set snmp community (Section 5.2.2.11)
- clear snmp community (Section 5.2.2.12)

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5.2.2.1 show snmp user

Use this command to display information about users. These are people registered to access SNMP management.

show snmp user [*user* [**remote** *remote*]]

Syntax Description

user	(Optional) Displays information about a specific user.
remote *remote*	(Optional) Displays information about users on a specific remote SNMP engine.

Command Defaults

- If *user* is not specified, information about all SNMP users will be displayed.
- If **remote** is not specified, user information about the local SNMP engine will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display information for the SNMP “guest” user:

```
 Matrix>show snmp user guest
--- SNMP user information ---
EngineId:  00:00:00:63:00:00:00:a1:00:00:00:00
Username                = Guest
Auth protocol           = usmNoAuthProtocol
Privacy protocol        = usmNoPrivProtocol
Storage type            = nonVolatile
Row status              = active
```

Table 5-4 shows a detailed explanation of the command output.

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Table 5-4 show snmp user Output Details

Output	What It Displays...
EngineId	SNMP local engine identifier.
Username	SNMPv1 or v2 community name or SNMPv3 user name.
Auth protocol	Type of authentication protocol applied to this user.
Privacy protocol	Whether a privacy protocol is applied when authentication protocol is in use.
Storage Type	Whether access entries for this group are stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

5.2.2.2 set snmp user

Use this command to create a new SNMPv3 user.

set snmp user *user* [**authentication md5** [**privacy**]] [**remote** *remoteid*] [**volatile** | **nonvolatile**]

Syntax Description

user	Specifies a name for the SNMPv3 user.
authentication md5	(Optional) Specifies the authentication type required for this user as MD5.
privacy	(Optional) Applies DES encryption.
remote *remoteid*	(Optional) Registers the user on a specific remote SNMP engine.
volatile | **nonvolatile**	(Optional) Specifies a storage type for this user entry.

Command Defaults

- If **authentication** is not specified, no authentication will be applied.
- If **privacy** is not specified, no encryption will be applied.

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- If **remote** is not specified, the user will be registered for the local SNMP engine.
- If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create a new SNMP user named "netops" with MD5 authentication and privacy encryption:

```
Matrix>set snmp user netops authentication md5 privacy
Matrix>Enter authentication password>***********
Matrix>Reenter authentication password>***********
Matrix>Enter privacy password>***********
Matrix>Reenter privacy password>***********
```

5.2.2.3 clear snmp user

Use this command to remove a user from the SNMPv3 security-model list.

clear snmp user *user* [**remote** *remote*]

Syntax Description

user	Specifies an SNMPv3 user to remove.
remote *remote*	(Optional) Removes the user from a specific remote SNMP engine.

Command Defaults

If **remote** is not specified, the user will be removed from the local SNMP engine.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to remove the SNMP user named “bill”:

```
Matrix>clear snmp user bill
```

5.2.2.4 show snmp group

Use this command to display an SNMP group configuration. An SNMP group is a collection of SNMPv3 users who share the same access privileges.

show snmp group [*groupname*] [**user** *user*] [**security-model** {**v1** | **v2** | **v3**}]

Syntax Description

groupname *groupname*	(Optional) Displays information for a specific SNMP group.
user *user*	(Optional) Displays information about users within the specified group.
security-model v1 | **v2** | **v3**	(Optional) Displays information about groups assigned to a specific security SNMP model.

Command Defaults

- If *groupname* is not specified, information about all SNMP groups will be displayed.
- If *user* is not specified, information about all SNMP users will be displayed.
- If **security-model** is not specified, user information about all SNMP versions will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SNMP group information:

```
Matrix>show snmp group
--- SNMP group information ---
Security model          = SNMPv1
Security/user name      = public
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active

Security model          = SNMPv1
Security/user name      = public.router1
Group name              = Anyone
Storage type            = nonVolatile
Row status              = active
```

Table 5-5 shows a detailed explanation of the command output.

Table 5-5 show snmp group Output Details

Output	What It Displays...
Security model	SNMP version associated with this group.
Security/user name	Users belonging to the SNMP group.
Group name	Name of SNMP group.
Storage Type	Whether access entries for this group are stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

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5.2.2.5 set snmp group

Use this command to create an SNMP group. This associates SNMPv3 users to a group that shares common access privileges.

set snmp group *groupname* **user** *user* **security-model** {**v1** | **v2** | **v3**} [**volatile** | **nonvolatile**]

Syntax Description

groupname	Specifies an SNMP group name to create.
user *user*	Specifies an SNMPv3 user name to assign to the group.
security-model v1 | **v2** | **v3**	Specifies an SNMP security model to assign to the group.
volatile | **nonvolatile**	(Optional) Specifies a storage type for SNMP entries associated with the group.

Command Defaults

If storage type is not specified, **nonvolatile** storage will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP group called “anyone”, assign a user named “public” and assign SNMPv3 security to the group:

```
Matrix E7(rw)->set snmp group anyone user public security-model v3
```


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5.2.2.6 clear snmp group

Use this command to clear SNMP group settings globally or for a specific SNMP group or user.

clear snmp group *groupname user* [**security-model** {**v1** | **v2** | **v3**}]

Syntax Description

groupname	Specifies the SNMP group to be cleared.
user	Specifies the SNMP user to be cleared.
security-model v1 | **v2** | **v3**	(Optional) Clears the settings associated with a specific security model.

Command Defaults

- If *groupname* is not specified, settings will be cleared for all SNMP groups.
- If *user* is not specified, settings will be cleared for all SNMP users.
- If **security-model** is not specified, settings will be cleared for all SNMP versions.
- If no parameters are specified, all SNMP group settings will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all settings assigned to the “public” user within the SNMP group “anyone”:

```
Matrix>clear snmp group anyone public
```


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5.2.2.7 show community

Use this command to display SNMPv1 and v3 community names and access policies. In SNMPv1 and v2, community names act as passwords to remote SNMP management. Access is controlled by enacting either of two levels of security authorization (Read-Only or Read-Write).

show community

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display community names and access policies:

```
Matrix>show community
   Community Name       Permissions
 ------------------     -----------
  Public                Read-Write
  Private               Read-Write
```

Table 5-6 provides an explanation of the command output. For details on using the **set community** command to assign variables, refer to Section 5.2.2.11.

Table 5-6 show community Output Details

Output	What It Displays...
Community Name	Name through which a user will access SNMP management.
Permissions	Access policy granted to each community name, either **ro** (Read-Only) or **rw** (Read-Write).

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5.2.2.8 set community

Use this command to set SNMPv1 and v2 community names and access policies.

set community *community_name access_ policy*

Syntax Description

community_name	Specifies the name through which a user will access SNMP management. Up to 5 community names can be set.
access_ policy	Specifies the access permission accorded each community name. The available access levels are: • Read-Only (**ro**): This community name gives the user Read-Only access to the device MIB objects, and excludes access to security-protected fields of Read-Write authorization. • Read-Write (**rw**): This community name gives the user Read-Write access to the device MIB objects.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the community name “green” for Read-Write access:

```
Matrix>set community green rw
```


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5.2.2.9 clear community

Use this command to delete an SNMPv1 or v2 community name.

clear community *community_name*

Syntax Description

community_name	Specifies the SNMP management user access name to be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete the community name “green.”

```
Matrix>clear community green
```

5.2.2.10 show snmp community

Use this command to display the mapping of SNMPv1and v2 community names to SNMPv3 access policies.

show snmp community [*name*]

Syntax Description

name	(Optional) Displays SNMP information for a specific community name.

Command Defaults

If *name* is not specified, information will be displayed for all SNMP communities.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display SNMPv3 information about the “public” community name:

```
Matrix>show snmp community public

Community Name: public
Security User Name: initial-restricted
SNMP Engine ID: 80:00:38:18:03:00:01:f4:d2:bc:80
Storage Type: nonvolatile
Row Status: active
```

5.2.2.11 set snmp community

Use this command to create a relationship between an SNMP v1 or v2 community name and an SNMPv3 access policy.

set snmp community {*name* **user** *username*} [**volatile** | **nonvolatile**]

Syntax Description

name	Specifies a community name.
user *username*	Specifies the SNMPv3 user name to which this community name will be mapped. For details on creating an SNMP v3 user, refer to Section 5.2.2.2.
volatile | **nonvolatile**	(Optional) Specifies the storage type for these entries.

Command Defaults

If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to allow the SNMPv1 “green” community access to the “netops” user security policies:

```
Matrix>set snmp community green netops
```

5.2.2.12 clear snmp community

Use this command to remove a relationship between an SNMP v1 or v2 community name and an SNMPv3 access policy.

clear snmp community *name*

Syntax Description

name	Specifies the SNMPv1 or v2 community name for which the SNMPv3 relationship will be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove the “green” community’s access to the “netops” user security policy:

```
Matrix>clear snmp community green
```


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5.2.3 Configuring SNMP Access Rights

Purpose

To review and configure SNMP access rights, assigning viewing privileges and security levels to SNMP user groups.

Commands

The commands needed to review and configure SNMP access are listed below and described in the associated section as shown.

- show snmp access (Section 5.2.3.1)
- set snmp access (Section 5.2.3.2)
- clear snmp access (Section 5.2.3.3)
- show snmp authentiationtrap (Section 5.2.3.4)
- set snmp authentiationtrap (Section 5.2.3.5)

5.2.3.1 show snmp access

Use this command to display access rights and security levels configured for SNMP one or more groups.

show snmp access [*groupname*] [**security-model** {**v1** | **v2** | **v3** {**noauth** | **auth** | **authpriv**}]

Syntax Description

groupname	(Optional) Displays access information for a specific SNMPv3 group.
security-model v1 | **v2** | **v3**	(Optional) Displays access information for SNMP security model version 1, 2c or 3.
noauth | **auth** | **authpriv**	(Optional) Displays access information for a specific security level.

Command Defaults

- If *groupname* is not specified, access information for all SNMP groups will be displayed.

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- If **security-model** is not specified, access information for all SNMP versions will be displayed.
- If access level is not specified, information for all levels will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP access information:

```
Matrix>show snmp access
Group Name: initial
Security Model: SNMPv3
Security Level: No authentication.  No Privacy.
Storage Type: nonvolatile
Row Status: active
Read View Name: internet
Write View Name: internet
Notify View Name: internet

------------------------------

Group Name: initial-restricted
Security Model: - SNMPv3
Security Level: No authentication.  No Privacy.
Storage Type: nonvolatile
Row Status: active
Read View Name: internet
Write View Name:
Notify View Name: internet
```

Table 5-7 shows a detailed explanation of the command output.

Table 5-7 show snmp access Output Details

Output	What It Displays...
Group Name	SNMPv3 group name.
Security Model	Security model applied to this group. Valid types are: SNMP**v1**, SNMP**v2**, and SNMP**v3**.

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Table 5-7 show snmp access Output Details (Continued)

Output	What It Displays...
Security Level	Security level applied to this group. Valid levels are: • **noauth** — No authentication or privacy protocol required. • **auth** — Authentication but no privacy protocol required. • **authpriv** — Authentication and privacy protocol required.
Storage Type	Whether access entries for this group are stored in **volatile**, **nonvolatile** or **read-only** memory.
Row Status	Status of this entry: **active**, **notInService,** or **notReady**.
Read View Name	Name of the view that allows this group to view SNMP MIB objects.
Write View Name	Name of the view that allows this group to configure the contents of the SNMP agent.
Notify View Name	Name of the view that allows this group to send an SNMP notification. This can be configured with the set snmp notify command as described in Section 5.2.7.7.

5.2.3.2 set snmp access

Use this command to set an SNMP access configuration.

set snmp access *groupname* **security-model** {**v1** | **v2** | **v3** {**noauth** | **auth** | **authpriv**}} [**read** *read*] [**write** *write*] [**notify** *notify*] [**volatile** | **nonvolatile**]

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Syntax Description

groupname	Specifies a name for an SNMP group.
security-model v1 | **v2** | **v3**	Applies SNMP version 1, 2c or 3.
noauth | **auth** | **authpriv**	Applies an SNMPv3 security level as no authentication, authentication without privacy or authentication with privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
read *read*	(Optional) Applies read access view.
write *write*	(Optional) Applies a write access view.
notify *notify*	(Optional) Applies a notify access view. This can be configured with the s**et snmp notify** command as described in Section 5.2.7.7.
volatile | **nonvolatile** |	(Optional) Stores associated SNMP entries as temporary or remaining across device restarts.

Command Defaults

- If **read** view is not specified none will be applied.
- If **write** view is not specified, none will be applied.
- If **notify** view is not specified, none will be applied.
- If storage type is not specified, entries will be held through device reboot.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set SNMP access privileges for the “mis-group” using the SNMP version 3 security model, authentication and privacy protocols, and allowing them to receive notification messages specified the “hello” notification configuration:

```
Matrix>set snmp access mis-group security-model v3 authpriv notify hello
```


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5.2.3.3 clear snmp access

Use this command to clear the SNMP access entry of a specific group, including its set SNMP security-model, and level of security.

clear snmp access *groupname* **security-model** {**v1** | **v2** | **v3** {**noauth** | **auth** | **authpriv**}}

Syntax Description

groupname	Specifies the name of the SNMP group for which to clear access.
security-model v1 | **v2** | **v3**	Specifies the security model to be cleared for the SNMP access group.
noauth | **auth** | **authpriv**	Clears a specific security level for the SNMPv3 access group.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP version 3 access for the “mis-group”:

```
Matrix>clear snmp access mis-group security-model v3 authpriv
```

5.2.3.4 show snmp authenticationtrap

Use this command to display the status of the SNMP authentication trap function.

show snmp authenticationtrap

Syntax Description

None.

Command Defaults

None.

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Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the status of the SNMP authentication trap function:

```
Matrix>show snmp authenticatontrap
 authentication traps enabled
```

5.2.3.5 set snmp authentication trap
Use this command to enable or disable the SNMP authentication trap function.

set snmp authenticationtrap {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the sending of SNMP authentication failure traps.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to enable the SNMP authentication trap function:

```
Matrix>set snmp authenticatontrap enable
```


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5.2.4 Configuring SNMP MIB Views

Purpose

To review and configure SNMP MIB views. SNMP views map SNMP objects to access rights.

Commands

The commands needed to review and configure SNMP MIB views are listed below and described in the associated section as shown.

- show snmp view (Section 5.2.4.1)
- set snmp view (Section 5.2.4.2)
- clear snmp view (Section 5.2.4.3)

5.2.4.1 show snmp view

Use this command to display the MIB configuration for SNMPv3 view-based access (VACM).

show snmp view [*viewname* **subtree** *oid*]]

Syntax Description

viewname **subtree** *oid*	(Optional) Displays information for a specific MIB view and subtree.

Command Defaults

If no parameters are specified, all SNMP MIB view configuration information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display configuration information for the SNMP MIB view “internet”:

```
Matrix>show snmp view internet

View Name: internet
Subtree OID: 1
View  Type: Included.
Row Status: active
Storage Type: nonvolatile
```

Table 5-8 provides an explanation of the command output. For details on using the **set snmp view** command to assign variables, refer to Section 5.2.4.2.

Table 5-8 show snmp view Output Details

Output	What It Displays...
View Name	Name assigned to a MIB view.
Subtree OID	Subtree object identifier.
View Type	Whether or not subtree use must be **included** or **excluded** for this view.
Row Status	Status of this entry: **active**, **notInService,** or **notReady**.
Storage Type	Whether storage is in **nonvolatile** or **volatile** memory

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5.2.4.2 set snmp view

Use this command to set a MIB configuration for SNMPv3 view-based access (VACM).

set snmp view *viewname* **subtree** *subtree* [**included** | **excluded**] [**volatile** | **nonvolatile**]

Syntax Description

viewname	Specifies a name for a MIB view
subtree *subtree*	Specifies a MIB subtree name.
included | **excluded**	(Optional) Specifies subtree use (default) or no subtree use.
volatile | **nonvolatile**	(Optional) Specifies the use of temporary (default) or nonvolatile storage.

Command Defaults

- If not specified, subtree use will be **included**.
- If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an SNMP MIB view to “public” with a subtree name of 1.3.6.1 included:

```
Matrix>set snmp view public subtree 1.3.6.1 included
```

5.2.4.3 clear snmp view

Use this command to delete an SNMPv3 MIB view.

clear snmp view *viewname* **subtree** *subtree*

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Syntax Description

viewname	Specifies the MIB view name to be deleted.
subtree *subtree*	Specifies the subtree name of the MIB view to be deleted.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete SNMP MIB view “public”:

```
Matrix>clear snmp view public subtree 1.3.6.1
```


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5.2.5 Configuring SNMP Target Parameters

Purpose

To review and configure SNMP target parameters. This controls where and under what circumstances SNMP notifications will be sent. A target parameter entry can be bound to a target IP address allowed to receive SNMP notification messages with the **set snmp targetaddr** command (Section 5.2.6.2).

Commands

The commands needed to review and configure SNMP target parameters are listed below and described in the associated section as shown.

- show snmp targetparams (Section 5.2.5.1)
- set snmp targetparams (Section 5.2.5.2)
- clear snmp targetparams (Section 5.2.5.3)

5.2.5.1 show snmp targetparams

Use this command to display SNMP parameters used to generate a message to a target.

show snmp targetparams [*targetparams*]

Syntax Description

targetparams	(Optional) Displays entries for a specific target parameter.

Command Defaults

If *targetParams* is not specified, entries associated with all target parameters will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SNMP target parameters information:

```
Matrix>show snmp targetparams

--- SNMP TargetParams information ---
Target Parameter Name   = v1ExampleParams
Security Name           = public
Message Proc. Model     = SNMPv1
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active

Target Parameter Name   = v2ExampleParams
Security Name           = public
Message Proc. Model     = SNMPv2
Security Level          = noAuthNoPriv
Storage type            = nonVolatile
Row status              = active

Target Parameter Name   = v3ExampleParams
Security Name           = CharlieDChief
Message Proc. Model     = v3
Security Level          = authNoPriv
Storage type            = nonVolatile
Row status              = active
```

Table 5-9 shows a detailed explanation of the command output.

Table 5-9 show snmp targetparams Output Details

Output	What It Displays...
Target Parameter Name	Unique identifier for the parameter in the SNMP target parameters table. Maximum length is 32 bytes.
Security Name	Security string definition.
Message Proc. Model	SNMP version.

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Table 5-9 show snmp targetparams Output Details (Continued)

Output	What It Displays...
Security Level	Type of security level. Valid levels are: • **noauth** — No authentication or privacy protocol required. • **auth** — Authentication but no privacy protocol required. • **authpriv** — Authentication and privacy protocol required.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

5.2.5.2 set snmp targetparams

Use this command to set SNMP target parameters, a named set of security/authorization criteria used to generate a message to a target.

set snmp targetparams *paramsname* **user** *user* **security-model** {**v1** | **v2c** | **v3**} **message-processing** {**v1** | **v2c** | **v3**} {**noauthentication** | **authentication** | **privacy**} [**volatile** | **nonvolatile**]

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Syntax Description

paramsname	Specifies a name identifying parameters used to generate SNMP messages to a particular target.
user *user*	Specifies an SNMPv1 or v2 community name or an SNMPv3 user name. Maximum length is 32 bytes.
security-model v1 | **v2** | **v3**	Specifies the SNMP security model applied to this target parameter as version 1, 2c or 3.
noauthentication | **authentication** | **privacy**	Specifies the SNMP security level applied to this target parameter as no authentication, authentication (without privacy) or privacy. Privacy specifies that messages sent on behalf of the user are protected from disclosure.
volatile | **nonvolatile**	(Optional) Specifies the storage type applied to this target parameter.

Command Defaults

If not specified, storage type will be set to **nonvolatile**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set SNMP target parameters named “v1ExampleParams” for a user named “fred” using version 3 security model and message processing, and authentication***:***

```
Matrix>set snmp targetparams v1ExampleParams user fred security-model v3
authentication
```


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5.2.5.3 clear snmp targetparams

Use this command to delete an SNMP target parameter configuration.

clear snmp targetparams *targetparams*

Syntax Description

targetparams	Specifies the name of the parameter in the SNMP target parameters table to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP target parameters named “v1ExampleParams”:

```
Matrix>clear snmp targetparams v1ExampleParams
```


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5.2.6 Configuring SNMP Target Addresses

Purpose

To review and configure SNMP target addresses which will receive SNMP notification messages. An address configuration can be linked to optional SNMP transmit, or target, parameters (such as timeout, retry count, and UDP port) set with the **set snmp targetparams** command (Section 5.2.5.2).

Commands

The commands needed to review and configure SNMP target addresses are listed below and described in the associated section as shown.

- show snmp targetaddr (Section 5.2.6.1)
- set snmp targetaddr (Section 5.2.6.2)
- clear snmp targetaddr (Section 5.2.6.3)

5.2.6.1 show snmp targetaddr

Use this command to display SNMP target address information.

show snmp targetaddr [*targetaddr*]

Syntax Description

targetaddr	(Optional) Displays information for a specific target address name.

Command Defaults

If *targetAddr* is not specified, entries for all target address names will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SNMP target address information:

```
Matrix>show snmp targetaddr

 --- SNMP targetaddr information ---
Target Address Name     = 1
Tag List                = Console
IP Address              = 127.0.0.1
UDP Port#               = 0
Target Mask             = 255.255.255.255
Timeout                 = 100
Retry count             = 3
Parameters              = v1ExampleParams
Storage type            = nonVolatile
Row status              = active

Target Address Name     = 2
Tag List                = Console
IP Address              = 127.0.0.1
UDP Port#               = 0
Target Mask             = 255.255.255.255
Timeout                 = 100
Retry count             = 3
Parameters              = v2ExampleParams
Storage type            = nonVolatile
Row status              = active
```

Table 5-10 shows a detailed explanation of the command output.

Table 5-10 show snmp targetaddr Output Details

Output	What It Displays...
Target Address Name	Unique identifier in the snmpTargetAddressTable.
Tag List	Tags a location to the target address as a place to send notifications.
IP Address	Target IP address.
UDP Port#	Number of the UDP port of the target host to use.
Target Mask	Target IP address mask.
Timeout	Timeout setting for the target address.
Retry count	Retry setting for the target address.

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Table 5-10 show snmp targetaddr Output Details (Continued)

Output	What It Displays...
Parameters	Entry in the snmpTargetParamsTable.
Storage type	Whether entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row status	Status of this entry: **active**, **notInService,** or **notReady**.

5.2.6.2 set snmp targetaddr

Use this command to set an SNMP target address configuration. The target address is a unique identifier and a specific IP address that will receive SNMP notification messages. This address configuration can be linked to optional SNMP transmit parameters (such as timeout, retry count, and UDP port).

set snmp targetaddr *targetaddr* **param** *param* **ipaddress** *ipaddr* [**port** *udpport*] [**timeout** *timeout*] [**retries** *retries*] [**volatile** | **nonvolatile**] [**taglist** *tagname*]

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Syntax Description

targetaddr	Specifies a unique identifier to index the snmpTargetAddrTable. Maximum length is 32 bytes.
param *param*	Specifies an entry in the SNMP target parameters table, which is used when generating a message to the target. Maximum length is 32 bytes.
ipaddress *ipaddr*	Specifies the IP address of the target.
port *udpport*	(Optional) Specifies which UDP port of the target host to use. Default value is 162.
timeout *timeout*	(Optional) Specifies the maximum round trip time allowed to communicate to this target address. This value is in .01 seconds and the default is 1500 (15 seconds.)
retries *retries*	(Optional) Specifies the number of message retries allowed if a response is not received. Default is 3.
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or nonvolatile storage for SNMP entries.
taglist *tagname*	(Optional) Specifies a list of SNMP notify tag values. This tags a location to the target address as a place to send notifications. List must be enclosed in quotes and tag values must be separated by a space (ie: **“tag 1 tag 2”**)

Command Defaults

- If not specified, *udpport* will be set to **162**.
- If not specified, *timeout* will be set to **1500** seconds.
- If not specified, number of *retries* will be set to **3**.
- If not specified, storage type will be **nonvolatile**.
- If **taglist** is not specified, none will be set.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set an SNMP target address of “1” associated with a parameter called v1ExampleParams on IP address 127.0.0.1 and UDP port 160:

```
Matrix>set snmp targetaddr 1 param v1ExampleParams ipaddress 127.0.0.1 udp 160
```

5.2.6.3 clear snmp targetaddr

Use this command to delete an SNMP target address entry.

clear snmp targetaddr *targetAddr*

Syntax Description

targetAddr	Specifies the target address entry to delete.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear SNMP target address entry “1”:

```
Matrix>clear snmp targetaddr 1
```


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5.2.7 Configuring SNMP Notification Parameters

Purpose

To configure SNMP notification parameters and optional filters. Notifications are entities which handle the generation of SNMP v1 and v2 “traps” or SNMP v3 “informs” messages to select management targets. Optional notification filters identify which targets should not receive notifications. For a sample SNMP trap configuration showing how SNMP notification parameters are associated with security and authorization criteria (target parameters) and mapped to a management target address, refer to Section 5.2.8.

Commands

The commands needed to configure SNMP notification parameters and filters are listed below and described in the associated section as shown.

- show trap (Section 5.2.7.1)
- set trap (Section 5.2.7.2)
- clear trap (Section 5.2.7.3)
- show newaddrtrap (Section 5.2.7.4)
- set newaddrtrap (Section 5.2.7.5)
- show snmp notify (Section 5.2.7.6)
- set snmp notify (Section 5.2.7.7)
- clear snmp notify (Section 5.2.7.8)
- show snmp notifyfilter (Section 5.2.7.9)
- set snmp notifyfilter (Section 5.2.7.10)
- clear snmp notifyfilter (Section 5.2.7.11)
- show snmp notifyprofile (Section 5.2.7.12)
- set snmp notifyprofile (Section 5.2.7.13)
- clear snmp notifyprofile (Section 5.2.7.14)

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5.2.7.1 show trap

Use this command to display SNMP trap configuration information.

show trap

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only

Example

This example shows how to display the SNMP trap configuration. In this case, there are two SNMP traps enabled. One is assigned to the “orange” community at IP address 1.2.3.4. Another is assigned to the “blue” community at IP address 100.54.5.112.

```
Matrix>show trap
 Community Name          IP Address        Status
 --------------------    ---------------   --------
 orange                  1.2.3.4           enabled
 blue                    100.54.5.112      enabled
 public                  0.0.0.0           disabled
 public                  0.0.0.0           disabled
 public                  0.0.0.0           disabled
```

Table 5-11 provides an explanation of the command output. For details on using the **set trap** command to assign variables, refer to Section 5.2.7.2.

Table 5-11 show trap Output Details

Output	What It Displays...
Community Name	Community name of the trap.
IP Address	IP address of the trap.
Status	Whether the trap is enabled or disabled.

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5.2.7.2 set trap

Use this command to assign an SNMP trap to an IP address. Since the device is an SNMP compliant device, it can send messages to multiple network management stations to alert users of status changes. For details on the types of traps this device supports, refer to the appropriate *Matrix E1 Release Notes*.

set trap *ip_ address community_name* {**enable** | **disable**}

Syntax Description

ip_address	Specifies the IP address of the management station where traps will be set.
community_name	Specifies the community name of the trap to be set.
enable | **disable**	Enables or disables the trap.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable a trap on IP address 172.29.65.123 in the “blue” community:

```
Matrix>set trap 172.29.65.123 blue enable
```

5.2.7.3 clear trap

Use this command to clear an SNMP trap assigned to an IP address.

clear trap *ip_address*

Syntax Description

ip_address	Specifies the IP address of the trap to be cleared.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write

Example

This example shows how to clear the trap assigned to IP address 172.29.65.123:

```
Matrix>clear trap 172.29.65.123
```

5.2.7.4 show newaddrtrap

Use this command to display the status of the SNMP new MAC addresses trap function on one or more ports.

show newaddrtrap [*port-string*]

Syntax Description

port-string	(Optional) Displays the status of the new MAC addresses trap function on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, the status of the new MAC addresses trap function will be displayed for all ports.

Command Mode

Read-Only.

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Example

This example shows how to display the status of the new MAC address trap function on all Gigabit Ethernet ports:

```
Matrix>show newaddrtrap ge.*.*
  New Address Trap Globally disabled
  Port     Enable State
  -------  -----------
  ge.0.1   disabled
  ge.0.2   disabled
  ge.0.3   disabled
  ge.0.4   disabled
  ge.0.5   disabled
  ge.0.6   disabled
```

5.2.7.5 set newaddrtrap

Use this command to enable or disable SNMP trap messaging, globally or on one or more ports, when new source MAC addresses are detected.

NOTE: Transmitting SNMP new address traps requires that you configure the device with the SNMP management station information using the **set trap** command as described in Section 5.2.7.2.

set newaddrtrap [*port-string*] {**enable** | **disable**}

Syntax Description

port-string	(Optional) Enables or disables the MAC address trap function on specific port(s). If new source MAC addresses are detected via these ports, an SNMP trap message will be sent to the management station.
enable | **disable**	Globally enables or disables the MAC address trap function on all device ports.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to enable the new MAC address trap function on port ge.0.3:

```
Matrix>set newaddrtrap ge.0.3 enable
```

5.2.7.6 show snmp notify

Use this command to display the SNMP notify configuration, which determines which management targets will receive SNMP notifications.

show snmp notify [*notify*]

Syntax Description

notify	(Optional) Displays notify entries for a specific notify name.

Command Defaults

If a *notify* name is not specified, all entries will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the SNMP notify information:

```
Matrix>show snmp notify

 --- SNMP notifyTable information ---
Notify name     = 1
Notify Tag      = Console
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active

Notify name     = 2
Notify Tag      = TrapSink
Notify Type     = trap
Storage type    = nonVolatile
Row status      = active
```

Table 5-12 shows a detailed explanation of the command output.

Table 5-12 show snmp notify Output Details

Output	What It Displays...
Notify name	A unique identifier used to index the SNMP notify table.
Notify Tag	Name of the entry in the SNMP motify table.
Notify Type	Type of notification: SNMPv1 or v2 **trap** or SNMPv3 **InformRequest** message.
Storage Type	Whether access entry is stored in **volatile**, **nonvolatile** or **read-only** memory.
Row Status	Status of this entry: **active**, **notInService,** or **notReady**.

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5.2.7.7 set snmp notify

Use this command to set the SNMP notify configuration. This creates an entry in the SNMP notify table, which is used to select management targets who should receive notification messages. This command's **tag** parameter can be used to bind each entry to a target address using the **set snmp targetaddr** command (Section 5.2.6.2).

set snmp notify *notify* [**tag** *tag*] [**trap** | **inform**] [**volatile** | **nonvolatile**]

Syntax Description

notify	Specifies an SNMP notify name.
tag *tag*	(Optional) Specifies an SNMP notify tag. This binds the notify name to the SNMP target address table.
trap | **inform**	(Optional) Specifies SNMPv1 or v2 Trap messages (default) or SNMP v3 InformRequest messages.
volatile | **nonvolatile**	(Optional) Specifies temporary (default), or nonvolatile storage for SNMP entries.

Command Defaults

- If not specified, no **tag** will be set.
- If not specified, message type will be set to **trap**.
- If not specified, storage type will be set to **nonvolatile**.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an SNMP notify configuration with a notify name of "hello" and a notify tag of "world". Notifications will be sent as trap messages and storage type will automatically default to nonvolatile:

```
Matrix>set snmp notify hello tag world trap
```


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5.2.7.8 clear snmp notify

Use this command to clear an SNMP notify configuration.

set snmp notify *notify*

Syntax Description

notify	Specifies an SNMP notify name to clear.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the SNMP notify configuration for “hello”:

```
Matrix>clear snmp notify hello
```


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About SNMP Notify Filters

Profiles indicating which targets should not receive SNMP notification messages are kept in the NotifyFilter table. If this table is empty, meaning that no filtering is associated with any SNMP target, then no filtering will take place. “Traps” or “informs” notifications will be sent to all destinations in the SNMP targetAddrTable that have tags matching those found in the NotifyTable.

When the NotifyFilter table contains profile entries, the SNMP agent will find any filter profile name that corresponds to the target parameter name contained in an outgoing notification message. It will then apply the appropriate subtree-specific filter when generating notification messages.

5.2.7.9 show snmp notifyfilter

Use this command to display SNMP notify filter information, identifying which profiles will not receive SNMP notifications.

show snmp notifyfilter [*profile* **subtree** *oid*]

Syntax Description

profile **subtree** *oid*	(Optional) Displays a notify filter within a specific subtree.

Command Defaults

If no parameters are specified, all notify filter information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SNMP notify filter information. In this case, the notify profile "pilot1" in subtree 1.3.6 will receive SNMP notification messages:

```
Matrix>show snmp notifyfilter

--- SNMP notifyFilter information ---
Profile         = pilot1
Subtree         = 1.3.6
Filter type     = included
Storage type    = nonVolatile
Row status      = active
```

5.2.7.10 set snmp notifyfilter

Use this command to create an SNMP notify filter configuration. This identifies which management targets should and should not receive notification messages, which is useful for fine-tuning the amount of SNMP traffic generated.

By default, all management targets are excluded from receiving notification messages; therefore, you must create an SNMP notify filter for the management targets that should receive notification messages. If you create an SNMP notify filter to include all OIDs, you can then create SNMP notify filters to exclude specific OIDs. As an alternative, you can create SNMP notify filters to include specific OIDs; in which case, the OIDs that you do not specify will be excluded automatically.

set snmp notifyfilter *profile* **subtree** *oid* [**mask** *mask*] [**included** | **excluded**] [**volatile** | **nonvolatile**]

Syntax Description

profile	Specifies an SNMP filter notify name.
subtree *oid*	Specifies a MIB subtree target for the filter.
mask *mask*	(Optional) Applies a subtree mask.
included | **excluded**	(Optional) Specifies that subtree is included or excluded.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

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Command Defaults

- If not specified, **mask** is set to **255.255.255.255**
- If not specified, subtree will be **included**.
- If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP notify filter called “noauthentication” with a MIB subtree ID of 1, to include all management targets:

```
Matrix>set snmp notifyfilter noauthentication subtree 1 included
  nonvolatile
```

This example shows how to create an SNMP notify filter called “pilot1” with a MIB subtree ID of 1.3.6:

```
Matrix>set snmp notifyfilter pilot1 subtree 1.3.6
```

5.2.7.11 clear snmp notifyfilter

Use this command to delete an SNMP notify filter configuration.

clear snmp notifyfilter *profile* **subtree** *oid*

Syntax Description

profile	Specifies an SNMP filter notify name to delete.
subtree *oid*	Specifies a MIB subtree containing the filter to be deleted.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to delete the SNMP notify filter “pilot1”:

```
Matrix>clear snmp notifyfilter pilot1 subtree 1.3.6
```

5.2.7.12 show snmp notifyprofile

Use this command to display SNMP notify profile information. This associates target parameters to an SNMP notify filter to determine who should not receive SNMP notifications.

show snmp notifyprofile [*profile*] [**targetparam** *targetparam*]

Syntax Description

profile	(Optional) Displays a specific notify profile.
targetparam *targetparam*	(Optional) Displays entries for a specific target parameter.

Command Defaults

If no parameters are specified, all notify profile information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display SNMP notify information for the profile named “area51”:

```
Matrix>show snmp notifyprofile area51

 --- SNMP notifyProfile information ---
Notify Profile  = area51
TargetParam     = v3ExampleParams
Storage type    = nonVolatile
Row status      = active
```


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5.2.7.13 set snmp notifyprofile

Use this command to create an SNMP notify filter profile configuration. This associates a notification filter, created with the **set snmp notifyfilter** command (Section 5.2.7.10), to a set of SNMP target parameters to determine which management targets should not receive SNMP notifications.

set snmp notifyprofile *profile* **targetparam** *targetparam* [**volatile** | **nonvolatile**]

Syntax Description

profile	Specifies an SNMP filter notify name.
targetparam *targetparam*	Specifies an associated entry in the SNMP Target Params Table.
volatile | **nonvolatile**	(Optional) Specifies a storage type.

Command Defaults

If storage type is not specified, **nonvolatile** will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create an SNMP notify profile named area51 and associate a target parameters entry.

```
Matrix>set snmp notifyprofile area51 targetparam v3ExampleParams
```

5.2.7.14 clear snmp notifyprofile

Use this command to delete an SNMP notify profile configuration.

clear snmp notifyprofile *profile* **targetparam** *targetparam*

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Syntax Description

profile	Specifies an SNMP filter notify name to delete.
targetparam *targetparam*	Specifies an associated entry in the snmpTargetParamsTable.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete SNMP notify profile “area51”:

```
Matrix>clear snmp notifyprofile area51 targetparam v3ExampleParams
```


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5.2.8 Basic SNMP Trap Configuration

Traps are notification messages sent by an SNMPv1 or v3 agent to a network management station, a console, or a terminal to indicate the occurrence of a significant event, such as when a port or module goes up or down, when there are authentication failures, and when power supply errors occur. The following configuration example shows how to use CLI commands to associate SNMP notification parameters with security and authorization criteria (target parameters), and map the parameters to a management target address.

NOTE: This example illustrates how to configure an SNMPv3 trap notification. Creating an SNMPv1 trap, or an SNMPv3 “inform” notification would require using the same commands with different parameters, where appropriate.

Complete an SNMPv2 trap configuration on a Matrix E1 Series device as follows:

1. Create a community name that will act as an SNMP user password.
2. Create an SNMP target parameters entry to associate security and authorization criteria to the users in the community created in Step 1.
3. Verify if any applicable SNMP notification entries exist, or create a new one. You will use this entry to send SNMP notification messages to the appropriate management targets created in Step 2.
4. Create a target address entry to bind a management IP address to:
   - The notification entry and tag name created in Step 3, and
   - The target parameters entry created in Step 2.
5. Create an SNMP notify filter.

Table 5-13 shows the commands needed to complete an SNMPv3 trap configuration on a Matrix E1 Series device.

Table 5-13 Basic SNMP Trap Configuration Command Set

To do this...	Use these commands...
Create a community name.	**set community (**Section 5.2.2.8**)**
Create an SNMP target parameters entry.	**set snmp targetparams (**Section 5.2.5.2**)**
Verify if any applicable SNMP notification entries exist, or	**show snmp notify** (Section 5.2.7.6)

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Table 5-13 Basic SNMP Trap Configuration Command Set (Continued)

To do this...	Use these commands...
Create a new notification entry.	**set snmp notify (**Section 5.2.7.7**)**
Create a target address entry.	**set snmp targetaddr (**Section 5.2.6.2**)**
Create an SNMP notify filter.	**set snmp notifyfilter (**Section 5.2.7.10)

Example

The example in Figure 5-1 shows how to:

- create an SNMP community called “mgmt”
- configure a trap notification called “TrapSink”.
  This trap notification will be sent with the community name “mgmt” to the workstation 192.168.190.80 (which is target address “tr”). It will use security and authorization criteria contained in a target parameters entry called “v3ExampleParams”.
- Create an SNMP notify filter called “noauthentication” with a MIB subtree ID of 1, to include all management targets

Figure 5-1 Creating a Basic SNMP Trap Configuration

```
Matrix>set snmp community mgmt
Matrix>set snmp targetparams v3ExampleParams user mgmt security-model v3
  message-processing v3 authentication
Matrix>set snmp notify 1 tag TrapSink
 Matrix>set snmp targetaddr tr param v3ExampleParams ipaddress 192.168.190.80
  taglist “TrapSink”
 Matrix>set snmp notifyfilter noauthentication subtree 1 included nonvolatile
```


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6

Spanning Tree Configuration

This chapter describes the Spanning Tree Configuration set of commands and how to use them.

6.1 SPANNING TREE CONFIGURATION SUMMARY

6.1.1 Overview: Single, Rapid and Multiple Spanning Tree Protocols

The IEEE 802.1D Spanning Tree Protocol (STP) resolves the problems of physical loops in a network by establishing one primary path between any two devices in a network. Any duplicate paths are barred from use and become standby or blocked paths until the original path fails, at which point they can be brought into service.

RSTP

The IEEE 802.1w Rapid Spanning Protocol (RSTP), an evolution of 802.1D, can achieve much faster convergence than legacy STP in a properly configured network. RSTP significantly reduces the time to reconfigure the network's active topology when physical topology or configuration parameter changes occur. It selects one switch as the root of a Spanning Tree-connected active topology and assigns port roles to individual ports on the switch, depending on whether that port is part of the active topology.

RSTP provides rapid connectivity following the failure of a switch, switch port, or a LAN. A new root port and the designated port on the other side of the bridge transition to forwarding through an explicit handshake between them. By default, user ports are configured to rapidly transition to forwarding in RSTP.

MSTP

The IEEE 802.1s Multiple Spanning Tree Protocol (MSTP) builds upon 802.1D and RSTP by optimizing utilization of redundant links between switches in a network. When redundant links exist between a pair of switches running single STP, one link is forwarding while the others are blocking for all traffic flowing between the two switches. The blocking links are effectively used

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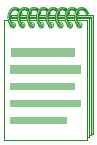
only if the forwarding link goes down. MSTP assigns each VLAN present on the network to a particular Spanning Tree instance, allowing each switch port to be in a distinct state for each such instance: blocking for one Spanning Tree while forwarding for another. Thus, traffic associated with one set of VLANs can traverse a particular inter-switch link, while traffic associated with another set of VLANs can be blocked on that link. If VLANs are assigned to Spanning Trees wisely, no inter-switch link will be completely idle, maximizing network utilization.

For details on creating Spanning Tree instances, refer to Section 6.2.1.7.

For details on mapping Spanning Tree instances to VLANs, refer to Section 6.2.1.10.



NOTE: MSTP and RSTP are fully compatible and interoperable with each other and with legacy STP 802.1D.

6.1.2 Spanning Tree Features

The Matrix E1 device meets the requirements of the Spanning Tree Protocols by performing the following functions:

- Creating a single Spanning Tree from any arrangement of switching or bridging elements.
- Compensating automatically for the failure, removal, or addition of any device in an active data path.
- Achieving port changes in short time intervals, which establishes a stable active topology quickly with minimal network disturbance.
- Using a minimum amount of communications bandwidth to accomplish the operation of the Spanning Tree Protocol.
- Reconfiguring the active topology in a manner that is transparent to stations transmitting and receiving data packets.
- Managing the topology in a consistent and reproducible manner through the use of Spanning Tree Protocol parameters.

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6.1.3 Process Overview: Spanning Tree Configuration

CAUTION: Spanning Tree configuration should be performed only by personnel who are very knowledgeable about Spanning Trees and the configuration of the Spanning Tree Algorithm. Otherwise, the proper operation of the network could be at risk.

Use the following steps as a guide in the Spanning Tree configuration process:

1. Reviewing and setting Spanning Tree bridge (device) parameters (Section 6.2.1)
2. Reviewing and setting Spanning Tree port parameters (Section 6.2.2)

NOTE: The term “bridge” is used as an equivalent to the term “switch” or “device” in this document.

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6.2 SPANNING TREE CONFIGURATION COMMAND SET

6.2.1 Reviewing and Setting Spanning Tree Bridge Parameters

Purpose

To display and set Spanning Tree bridge parameters, including device priorities, hello time, maximum age time, forward delay, path cost, topology change trap suppression, maximum hop count, and transmit hold count.

Commands

The commands needed to review and set Spanning Tree bridge parameters are listed below and described in the associated section as shown.

- show spantree stats (Section 6.2.1.1)
- set spantree (Section 6.2.1.2)
- show spantree version (Section 6.2.1.3)
- set spantree version (Section 6.2.1.4)
- clear spantree version (Section 6.2.1.5)
- show spantree mstilist (Section 6.2.1.6)
- set spantree msti (Section 6.2.1.7)
- clear spantree msti (Section 6.2.1.8)
- show spantree mstmap (Section 6.2.1.9)
- set spantree mstmap (Section 6.2.1.10)
- clear spantree mstmap (Section 6.2.1.11)
- show spantree vlanlist (Section 6.2.1.12)
- show spantree mstcfgid (Section 6.2.1.13)
- set spantree mstcfgid (Section 6.2.1.14)
- clear spantree mstcfgid (Section 6.2.1.15)
- set spantree priority (Section 6.2.1.16)
- clear spantree priority (Section 6.2.1.17)
- show spantree bridgehellomode (Section 6.2.1.18)

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- set spantree bridgehellomode (Section 6.2.1.19)
- clear spantree bridgehellomode (Section 6.2.1.20)
- set spantree hello (Section 6.2.1.21)
- clear spantree hello (Section 6.2.1.22)
- set spantree maxage (Section 6.2.1.23)
- clear spantree maxage (Section 6.2.1.24)
- set spantree fwddelay (Section 6.2.1.25)
- clear spantree fwddelay (Section 6.2.1.26)
- show spantree autoedge (Section 6.2.1.27)
- set spantree autoedge (Section 6.2.1.28)
- clear spantree autoedge (Section 6.2.1.29)
- show spantree legacypathcost (Section 6.2.1.30)
- set spantree legacypathcost (Section 6.2.1.31)
- clear spantree legacypathcost (Section 6.2.1.32)
- show spantree tctrapsuppress (Section 6.2.1.33)
- set spantree tctrapsuppress (Section 6.2.1.34)
- clear spantree tctrapsuppress (Section 6.2.1.35)
- show spantree txholdcount (Section 6.2.1.36)
- set spantree txholdcount (Section 6.2.1.37)
- clear spantree txholdcount (Section 6.2.1.38)
- set spantree maxhops (Section 6.2.1.39)
- clear spantree maxhops (Section 6.2.1.40)

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6.2.1.1 show spantree stats

Use this command to display Spanning Tree information for one or more ports or Spanning Trees.

show spantree stats [**sid** *sid*] [**port** *port-string*]

Syntax Description

sid *sid*	(Optional) Displays Spanning Tree information for a specific Spanning Tree.
port *port-string*	(Optional) Displays Spanning Tree information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

- If *port-string* is not specified, Spanning Tree information for the device will be displayed.
- If *sid* is not specified, information for Spanning Tree 0 will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display Spanning Tree information for Fast Ethernet front panel port 1:

```
Matrix>show spantree stats port fe.0.1

Spanning tree               - enabled
Spanning tree instance      - 0
Designated Root MacAddr     - 00:00:1d:11:71:00
Designated Root Priority    - 32768
Designated Root Cost        - 0
Designated Root Port        - 0
Root Max Age                - 20 sec
Root Hello Time             - 2 sec
Root Hold Time              - 1 sec
Root Forward Delay          - 15 sec
Bridge ID Mac Address       - 00:00:1d:11:71:00
Bridge ID Priority          - 32768
Bridge Max Age              - 20 sec
Bridge Hello Time           - 2 sec
Bridge Forward Delay        - 15 sec
Topology Change Count       - 6
Max Hops                    - 20

SID   Port     State        Role        Cost       Priority
-------------------------------------------------------------
0    fe.0.1   blocking     disabled    100        128
```

Table 6-1 provides an explanation of command output.

Table 6-1 show spantree stats Output Details

Output	What It Displays...
Spanning tree	Whether the Spanning Tree Protocol is enabled or disabled. Default state of enabled can be changed using the **set spantree** command (Section 6.2.1.2).
Spanning tree instance	Spanning Tree ID. Set using the **set spantree msti** command (Section 6.2.1.7).
Designated Root MacAddr	MAC address of the designated Spanning Tree root bridge.
Designated Root Priority	Priority of the designated root bridge.

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Table 6-1 show spantree stats Output Details (Continued)

Output	What It Displays...
Designated Root Cost	Total path cost to reach the root.
Designated Root Port	Port through which the root bridge can be reached.
Root Max Age	Amount of time (in seconds) a BPDU packet should be considered valid.
Root Hello Time	Interval (in seconds) at which the root device sends BPDU (Bridge Protocol Data Unit) packets. The device with the highest priority becomes the STA root device.
Root Hold Time	Minimum interval (in seconds) at which any BPDU can be sent. Set to 1 second.
Root Forward Delay	Amount of time (in seconds) the root device spends in listening or learning mode.
Bridge ID Mac Address	Unique bridge MAC address, recognized by all bridges in the network.
Bridge ID Priority	Bridge priority, which is a default value, or is assigned using the **set spantree priority** command. For details, refer to Section 6.2.1.16.
Bridge Max Age	Maximum time (in seconds) the bridge can wait without receiving a configuration message (bridge “hello”) before attempting to reconfigure. This is a default value, or is assigned using the **set spantree maxage** command. For details, refer to Section 6.2.1.23.
Bridge Hello Time	Amount of time (in seconds) the bridge sends BPDUs. This is a default value, or is assigned using the **set spantree hello** command. For details, refer to Section 6.2.1.21.
Bridge Forward Delay	Amount of time (in seconds) the bridge spends in listening or learning mode. This is a default value, or is assigned using the **set spantree fwddelay** command. For details, refer to Section 6.2.1.25.
Topology Change Count	Count of topology change notifications.

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Table 6-1 show spantree stats Output Details (Continued)

Output	What It Displays...
Max Hops	Spanning Tree maximum hop count. Default of 20 can be changed using the **set spantree maxhops** command, as described in Section 6.2.1.39.
SID	Spanning Tree ID.
Port	Spanning Tree port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
State	Spanning Tree port state (listening, learning, forwarding or blocked).
Role	Whether the port's Spanning Tree role is root, designated, backup, alternate, disabled or master.
Cost	Cost value assigned to the port.
Priority	Port's Spanning Tree priority.

6.2.1.2 set spantree

Use this command to globally enable or disable the Spanning Tree protocol on the switch.

set spantree {**disable** | **enable**}

Syntax Description

disable | **enable**	Globally disables or enables Spanning Tree.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example
This example shows how to disable Spanning Tree on the device:

```
Matrix>set spantree disable
```

6.2.1.3 show spantree version
Use this command to display the current version of the Spanning Tree protocol running on the device.

show spantree version

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display Spanning Tree version information:

```
Matrix>show spantree version
Spanning Tree Version = MSTP
```


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6.2.1.4 set spantree version

Use this command to set the version of the Spanning Tree protocol to RSTP (Rapid Spanning Tree Protocol) or to STP 802.1D-compatible.

set spantree version {**mstp** | **rstp** | **stpcompatible**}

NOTE: In most networks, Spanning Tree version should not be changed from its default setting of **mstp** (Multiple Spanning Tree Protocol) mode. MSTP mode is fully compatible and interoperable with legacy STP 802.1D and Rapid Spanning Tree (RSTP) bridges. Setting the version to **stpcompatible** mode will cause the bridge to transmit only 802.1D BPDUs, and will prevent non-edge ports from rapidly transitioning to forwarding state.

Syntax Description

mstp	Specifies Spanning Tree version 802.1s (MSTP).
rstp	Specifies Spanning Tree version 802.1w (RSTP).
stpcompatible	Specifies STP 802.1D-compatible.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to change the Spanning Tree version from the default of MSTP to STP:

```
Matrix>set spantree version stpcompatible
```

6.2.1.5 clear spantree version

Use this command to reset the version of the Spanning Tree protocol to the default mode of MSTP.

clear spantree version

Syntax Description

None.

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Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the version of the Spanning Tree protocol to MSTP:

```
Matrix>clear spantree version
```

6.2.1.6 show spantree mstilist

Use this command to display a list of Multiple Spanning Tree (MST) instances configured on the device.

show spantree mstilist

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display a list of MST instances. In this case, SID 2 has been configured:

```
Matrix>show spantree mstilist
 Configured Multiple Spanning Tree instances:
  2
```


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6.2.1.7 set spantree msti

Use this command to create or delete a Multiple Spanning Tree instance.

set spantree msti *sid* {**create** | **delete**}

Syntax Description

sid	Sets the Multiple Spanning Tree ID. Valid values are **1** - **4094**. **NOTE:** Matrix E1 devices will support up to 16 MST instances.
create | **delete**	Creates or deletes an MST instance.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create MST instance 2:

```
Matrix>set spantree msti 2 create
```

6.2.1.8 clear spantree msti

Use this command to delete one or more Multiple Spanning Tree instances.

clear spantree msti [*sid*]

Syntax Description

sid	(Optional) Deletes a specific multiple Spanning Tree ID.

Command Defaults

If *sid* is not specified, all MST instances will be cleared.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete all MST instances:

```
Matrix>clear spantree msti
```

6.2.1.9 show spantree mstmap

Use this command to display the mapping of a range of filtering database IDs (FIDs) to Spanning Trees. Since VLANs are mapped to FIDs, this shows to which SID a VLAN is mapped.

show spantree mstmap *first_fid_num* [*last_fid_num*]

Syntax Description

first_fid_num	Specifies the first in a range or FIDs for which MSTP mapping will be displayed. Valid values are **1 - 4094**, and must correspond to a VLAN ID created using the **set vlan** command as described in Section 7.3.2.1.
last_fid_num	(Optional) Specifies the last in a range or FIDs for which MSTP mapping will be displayed. Valid values are **1 - 4094**.

Command Defaults

If *last_fid_num* is not specified, all FID mapping information beginning with the *first_fid_num* will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display SID to FID mapping information for FIDs 1 through 8. In this case, no new mappings have been configured:

```
Matrix>show spantree mstmap 1 8

FID:        SID:
1           0
2           0
3           0
4           0
5           0
6           0
7           0
8           0
```

6.2.1.10 set spantree mstmap

Use this command to map a filtering database ID (FID) to a SID. Since VLANs are mapped to FIDs, this essentially maps a Spanning Tree SID to a VLAN ID.

set spantree mstmap *fid_num sid*

Syntax Description

fid_num	Specifies a FID to assign to the MST. Valid values are **1** - **4094**, and must correspond to a VLAN ID created using the **set vlan** command as described in Section 7.3.2.1.
sid	Specifies a Multiple Spanning Tree ID. Valid values are **1** - **4094**, and must correspond to a SID created using the **set msti** command as described in Section 6.2.1.7.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to map FID 3 to SID 2. This effectively maps VLAN 3 to Spanning Tree 2:

```
Matrix>set spantree mstmap 3 2
```

6.2.1.11 clear spantree mstmap

Use this command to map a FID back to SID 0.

clear spantree mstmap [*fid_num*]

Syntax Description

fid_num	(Optional) Resets the mapping of a specific FID. Valid values are **1 - 4094**, and must correspond to a VLAN ID created using the **set vlan** command as described in Section 7.3.2.1.

Command Defaults

If *fid_num* is not specified, all SID to FID mappings will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to map FID 2 back to SID 0:

```
Matrix>clear spantree mstmap 2
```

6.2.1.12 show spantree vlanlist

Use this command to display the VLAN(s) mapped to a Spanning Tree ID.

show spantree vlanlist *sid*

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Syntax Description

sid	Specifies a Multiple Spanning Tree ID. Valid values are **1 - 4094**, and must correspond to a SID created using the **set spantree msti** command as described in Section 6.2.1.7.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the VLAN(s) mapped to Spanning Tree 1. In this case, VLANs 2, 16 and 42 are mapped to SID 1. For this information to display, the SID instance must be created using the **set spantree msti** command as described in Section 6.2.1.7, and the FIDs must be mapped to SID 1 using the **set spantree mstmap** command as described in Section 6.2.1.10:

```
Matrix>show spantree vlanlist 1
 The following VLANs are assigned to SID 1: 2 16 42
```

6.2.1.13 show spantree mstcfgid
Use this command to display the MST configuration identifier elements, including format selector, configuration name, revision level, and configuration digest.

show spantree mstcfgid

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display the MST configuration identifier elements. In this case, the default revision level of 0, and the default configuration name (a string representing the bridge MAC address) have not been changed. For information on using the **set spantree mstcfgid** command to change these settings, refer to Section 6.2.1.14:

```
Matrix>show spantree mstcfgid
 MST Configuration Identifier:
  Format Selector: 0
  Configuration Name: 00:01:f4:89:51:94
  Revision Level: 0
  Configuration Digest: ac:36:17:7f:50:28:3c:d4:b8:38:21:d8:ab:26:de:62
```

6.2.1.14 set spantree mstcfgid

Use this command to set the MST configuration name and/or revision level.

set spantree mstcfgid {**cfgname** *name* | **rev** *level*}

Syntax Description

cfgname *name*	Specifies an MST configuration name.
rev *level*	Specifies an MST revision level. Valid values are **1** - **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the MST configuration name to mstconfig:

```
Matrix>set spantree mstconfigid cfgname mstconfig
```


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6.2.1.15 clear spantree mstcfgid

Use this command to reset the MST revision level to a default value of 0, and the configuration name to a default string representing the bridge MAC address.

clear spantree mstcfgid

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the MST configuration identifier elements to default values:

```
Matrix>clear spantree mstcfgid
```

6.2.1.16 set spantree priority

Use this command to set the bridge priority for one or more Spanning Trees. The device with the highest priority becomes the Spanning Tree root device. If all devices have the same priority, the device with the lowest MAC address will then become the root device.

set spantree priority *bridge_priority* [*sid*]

Syntax Description

bridge_priority	Specifies the priority of the bridge. Valid values are from **0** to **61440 (**in increments of 4096**)**, with 0 indicating high priority and 61440 low priority.
sid	(Optional) Sets a priority for a specific Spanning Tree.

Command Defaults

If *sid* is not specified, SID 0 will be assumed.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the bridge priority for SID 6 to 4096:

```
Matrix>set spantree priority 4096 6
```

6.2.1.17 clear spantree priority
Use this command to reset the bridge priority to the default value of 32768.

clear spantree priority [*sid*]

Syntax Description

sid	(Optional) Resets the bridge priority for a specific Spanning Tree.

Command Defaults
If *sid* is not specified, all SIDs will be reset.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to reset the bridge priority for SID 6:

```
Matrix>clear spantree priority 6
```


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6.2.1.18 show spantree bridgehellomode

Use this command to display the status of bridge hello mode on the device. When enabled, a single bridge administrative hello time is being used. When disabled, per-port administrative hello times are being used.

show spantree bridgehellomode

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the Spanning Tree bridge hello mode. In this case, a single bridge hello mode has been enabled using the **set spantree bridgehellomode** command as described in Section 6.2.1.21:

```
Matrix>show spantree bridgehellomode
 Bridge Hello Mode is currently enabled.
```

6.2.1.19 set spantree bridgehellomode

Use this command to enable or disable bridge hello mode on the device.

set spantree bridgehellomode {**enable** | **disable**}

Syntax Description

enable	Enables single Spanning Tree bridge hello mode.
disable	Disables single Spanning Tree bridge hello mode, allowing for the configuration of per-port hello times.

Command Defaults

None.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to disable single Spanning Tree hello mode on the device. Per-port hello times can now be configured using the **set spantree hellomode** command as described in Section 6.2.1.21:

```
Matrix>set spantree bridgehellomode disable
```

6.2.1.20 clear spantree bridgehellomode
Use this command to reset the Spanning Tree administrative hello mode to enabled.

clear spantree bridgehellomode

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to reset the Spanning Tree bridge hello mode to enabled:

```
Matrix>clear spantree bridgehellomode
```

6.2.1.21 set spantree hello
Use this command to set the hello time for the bridge or for one or more ports. This is the time interval (in seconds) the device will transmit BPDUs indicating it is active.

set spantree hello *interval* [*port-string*]

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Syntax Description

interval	Specifies the number of seconds the system waits before broadcasting a bridge hello message (a multicast message indicating that the system is active). Valid values are **1 - 10**.
port-string	(Optional) Sets the hello time for specific port(s). **NOTE:** Port-string cannot be specified if bridge hello mode is enabled. For information on using the **set spantree bridgehellomode** command, refer to Section 6.2.1.19.

Command Defaults

If *port-string* is not specified, hello time will be set for all ports (if bridge hello mode is disabled), or for the bridge (if bridge hello mode is enabled). For information on using the **set spantree bridgehellomode** command, refer to Section 6.2.1.19.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the bridge hello time to 3 seconds:

```
Matrix>set spantree hello 3
```

6.2.1.22 clear spantree hello

Use this command to reset the bridge hello time for the bridge or for one or more ports to the default value of 2 seconds.

clear spantree hello [*port-string*]

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Syntax Description

port-string	(Optional) Resets the hello time for specific port(s).
	NOTE: Port-string cannot be specified if bridge hello mode is enabled. For information on using the **set spantree bridgehellomode** command, refer to Section 6.2.1.19.

Command Defaults

If bridge mode is disabled, a *port-string* is required to reset all ports. For information on using the **set spantree bridgehellomode** command, refer to Section 6.2.1.19.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the bridge hello time to 2 seconds:

```
Matrix>clear spantree hello
```

6.2.1.23 set spantree maxage

Use this command to set the bridge maximum aging time. This is the maximum time (in seconds) a device can wait without receiving a configuration message (bridge “hello”) before attempting to reconfigure. All device ports (except for designated ports) should receive configuration messages at regular intervals. Any port that ages out STP information provided in the last configuration message becomes the designated port for the attached LAN. If it is a root port, a new root port is selected from among the device ports attached to the network.

set spantree maxage *agingtime*

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Syntax Description

agingtime	Specifies the maximum number of seconds that the system retains the information received from other bridges through STP. Valid values are **6** - **40**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum aging time to 25 seconds:

```
Matrix>set spantree maxage 25
```

6.2.1.24 clear spantree maxage

Use this command to reset the bridge maximum aging time to the default value of 20 seconds.

clear spantree maxage

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example
This example shows how to reset the bridge maximum aging time:

```
Matrix>clear spantree maxage
```

6.2.1.25 set spantree fwddelay
Use this command to set the Spanning Tree forward delay. This is the maximum time (in seconds) the root device will wait before changing states (i.e., listening to learning to forwarding). This delay is required because every device must receive information about topology changes before it starts to forward frames. In addition, each port needs time to listen for conflicting information that would make it return to a blocking state; otherwise, temporary data loops might result.

set spantree fwddelay *delay*

Syntax Description

delay	Specifies the number of seconds for the bridge forward delay. Valid values are **4 - 30**.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the bridge forward delay to 16 seconds:

```
Matrix>set spantree fwddelay 16
```

6.2.1.26 clear spantree fwddelay
Use this command to reset the bridge forward delay to the default setting of 15 seconds.

clear spantree fwddelay

Syntax Description
None.

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Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to reset the bridge forward delay to 15 seconds:

```
Matrix>clear spantree fwddelay
```

6.2.1.27 show spantree autoedge
Use this command to display the status of automatic edge port detection.

show spantree autoedge

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the status of the automatic edge port detection function:

```
Matrix>show spantree autoedge
 autoEdge is currently enabled.
```


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6.2.1.28 set spantree autoedge

Use this command to enable or disable the automatic edge port detection function.

set spantree autoedge {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables automatic edge port detection.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable automatic edge port detection:

```
Matrix>set spantree autoedge disable
```

6.2.1.29 clear spantree autoedge

Use this command to reset automatic edge port detection to the default state of enabled.

clear spantree autoedge

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example
This example shows how to reset automatic edge port detection to enabled:

```
Matrix>clear spantree autoedge
```

6.2.1.30 show spantree legacypathcost
Use this command to display the status of the legacy (802.1D) path cost setting.

show spantree legacypathcost

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the status of the legacy path cost setting:

```
Matrix>show spantree legacypathcost
Legacy path cost is currently enabled.
```

6.2.1.31 set spantree legacypathcost
Use this command to enable or disable legacy (802.1D) path cost values.

set spantree legacypathcost {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables legacy (802.1D) path cost values.

Command Defaults
None.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the default path cost values to 802.1D:

```
Matrix>set spantree legacypathcost enable
```

6.2.1.32 clear spantree legacypathcost
Use this command to reset path cost to 802.1D values.

clear spantree legacypathcost

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to reset legacy path cost:

```
Matrix>clear spantree legacypathcost
```

6.2.1.33 show spantree tctrapsuppress
Use this command to display the status of topology change trap suppression on Rapid Spanning Tree edge ports.

show spantree tctrapsuppress

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Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the status of topology change trap suppression:

```
Matrix>show spantree tctrapsuppress
Topology change trap suppression is currently enabled.
```

6.2.1.34 set spantree tctrapsuppress
Use this command to disable or enable topology change trap suppression on Rapid Spanning Tree edge ports. By default, RSTP non-edge (bridge) ports that transition to forwarding or blocking cause the switch to issue a topology change trap. When topology change trap suppression is enabled, which is the device default, edge ports (such as end station PCs) are prevented from sending topology change traps. This is because there is usually no need for network management to monitor edge port STP transition states, such as when PCs are powered on. When topology change trap suppression is disabled, all ports, including edge and bridge ports, will transmit topology change traps.

set spantree tctrapsuppress {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables topology change trap suppression.

Command Defaults
None.

Command Type
Switch command.

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Command Mode

Read-Write.

Example

This example shows how to allow Spanning Tree edge ports to transmit topology change traps:

```
Matrix>set spantree tctrapsuppress disable
```

6.2.1.35 clear spantree tctrapsuppress

Use this command to clear topology change trap suppression settings.

clear spantree tctrapsuppress

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear topology change trap suppression settings:

```
Matrix>clear spantree tctrapsuppress
```

6.2.1.36 show spantree txholdcount

Use this command to display the maximum BPDU transmission rate.

show spantree txholdcount

Syntax Description

None.

Command Defaults

None.

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Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the transmit hold count setting:

```
Matrix>show spantree txholdcount
Tx hold count = 3.
```

6.2.1.37 set spantree txholdcount
Use this command to set the maximum BPDU transmission rate. This is the number of BPDUs which will be transmitted before transmissions are subject to a one-second timer.

set spantree txholdcount *txholdcount*

Syntax Description

txholdcount	Specifies the maximum number of BPDUs to be transmitted before transmissions are subject to a one-second timer. Valid values are **1** to **10**. Default value is **3**.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the transmit hold count to 5:

```
Matrix>set spantree txholdcount 5
```


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6.2.1.38 clear spantree txholdcount

Use this command to reset the transmit hold count to the default value of 3.

clear spantree txholdcount

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the transmit hold count to 3:

```
Matrix>clear spantree txholdcount
```

6.2.1.39 set spantree maxhops

Use this command to set the Spanning Tree maximum hop count. This is the maximum number of hops that the information for a particular Spanning Tree instance may traverse (via relay of BPDUs within the applicable MST region) before being discarded.

set spantree maxhops *max_hop_count*

Syntax Description

max_hop_count	Specifies the maximum number of hops allowed. Valid values are **0** to **255**. Default value is **20**.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set the maximum hop count to 40:

```
Matrix>set spantree maxhops 40
```

6.2.1.40 clear spantree maxhops

Use this command to reset the maximum hop count to the default value of 20.

clear spantree maxhops

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the maximum hop count to 20:

```
Matrix>clear spantree maxhops
```


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6.2.2 Reviewing and Setting Spanning Tree Port Parameters

Purpose

To display and set Spanning Tree port parameters, including enabling or disabling the Spanning Tree algorithm on one or more ports, displaying blocked ports, displaying and setting Spanning Tree port priorities and costs, configuring edge port parameters, configuring the span guard function, and setting point-to-point protocol mode.

Commands

The commands needed to review and set Spanning Tree port parameters are listed below and described in the associated section as shown.

- show spantree portadmin (Section 6.2.2.1)
- set spantree portadmin (Section 6.2.2.2)
- clear spantree portadmin (Section 6.2.2.3)
- show spantree blocked ports (Section 6.2.2.4)
- show spantree portpri (Section 6.2.2.5)
- set spantree portpri (Section 6.2.2.6)
- clear spantree portpri (Section 6.2.2.7)
- show spantree portcost (Section 6.2.2.8)
- set spantree portcost (Section 6.2.2.9)
- clear spantree portcost (Section 6.2.2.10)
- show spantree adminedge (Section 6.2.2.11)
- set spantree adminedge (Section 6.2.2.12)
- clear spantree adminedge (Section 6.2.2.13)
- show spantree spanguard (Section 6.2.2.14)
- set spantree spanguard (Section 6.2.2.15)
- clear spantree spanguard (Section 6.2.2.16)
- show spantree spanguardtimeout (Section 6.2.2.17)
- set spantree spanguardtimeout (Section 6.2.2.18)

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- clear spantree spanguardtimeout (Section 6.2.2.19)
- show spantree spanguardlock (Section 6.2.2.20)
- clear spantree spanguardlock (Section 6.2.2.21)
- show spantree spanguardtrapenable (Section 6.2.2.22)
- set spantree spanguardtrapenable (Section 6.2.2.23)
- clear spantree spanguardtrapenable (Section 6.2.2.24)
- show spantree adminpoint (Section 6.2.2.25)
- set spantree adminpoint (Section 6.2.2.26)
- clear spantree adminpoint (Section 6.2.2.27)

6.2.2.1 show spantree portadmin

Use this command to display the status of the Spanning Tree algorithm on one or more ports.

show spantree portadmin *port-string*

Syntax Description

port-string	Specifies port(s) for which to display status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to show Spanning Tree status for all Gigabit Ethernet ports:

```
Matrix>show spantree portadmin ge.*.*
 Port ge.0.1 has portadmin set to enabled.
 Port ge.0.2 has portadmin set to enabled.
 Port ge.0.3 has portadmin set to enabled.
 Port ge.0.4 has portadmin set to enabled.
 Port ge.0.5 has portadmin set to enabled.
 Port ge.0.6 has portadmin set to enabled.
```

6.2.2.2 set spantree portadmin

Use this command to enable or disable the Spanning Tree algorithm on one or more ports.

set spantree portadmin *port-string* {**enable** | **disable**}

NOTE: Spanning Tree must be disabled on ports that will be dedicated as IP routing uplinks (VLANs). To display administrative status for all Spanning Tree ports, use the **show spantree portadmin** command as detailed in Section 6.2.2.1. For details on configuring VLANs for IP routing, refer to Section 3.3.2.

Syntax Description

port-string	Specifies the port(s) for which to enable or disable Spanning Tree. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	Enables or disables Spanning Tree.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable Spanning Tree on Fast Ethernet front panel port 12:

```
Matrix>set spantree portadmin fe.0.12 disable
```


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6.2.2.3 clear spantree portadmin

Use this command to reset the default Spanning Tree admin status to enable on one or more ports.

clear spantree portadmin [*port-string*]

Syntax Description

port-string	(Optional) Resets status to enable on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status will be reset on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to re-enable Spanning Tree on Fast Ethernet front panel port 12:

```
Matrix>clear spantree portadmin fe.0.12
```

6.2.2.4 show spantree blocked ports

Use this command to display the blocked ports in one or more Spanning Trees. A port in this state does not participate in the transmission of frames, thus preventing duplication arising through multiple paths existing in the active topology of the bridged LAN. It receives Spanning Tree configuration messages, but does not forward packets.

show spantree blockedports [*sid*]

Syntax Description

sid	(Optional) Displays status for specific SID(s).

Command Defaults

If *sid* is not specified, SID 0 will be displayed.

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Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the blocked ports in SID 1:

```
Matrix>show spantree blockedports 1
 Port ge.0.1 in Blocking State.
 Port ge.0.2 in Blocking State.
 Port ge.0.3 in Blocking State.
 Port ge.0.4 in Blocking State.
 Port ge.0.5 in Blocking State.
 Number of blocked ports in SID 1: 5
```

6.2.2.5 show spantree portpri

Use this command to show the Spanning Tree priority for one or more ports. If the path cost for all ports on a device is the same, the port with the highest priority (i.e., lowest value) will be configured as an active link in the Spanning Tree. When more than one port is assigned the highest priority, the port with the lowest numeric identifier will be enabled.

show spantree portpri *port-string* [*sid*]

Syntax Description

port-string	Specifies the port(s) for which to display Spanning Tree priority. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
sid	(Optional) Displays priority for specific SID(s).

Command Defaults

If *sid* is not specified, port priority for SID 0 will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the port priority for Fast Ethernet front panel port 3:

```
Matrix>show spantree portpri fe.0.3
port priority = 128 for port fe.0.3
```

6.2.2.6 set spantree portpri

Use this command to set a port's priority for use in the Spanning Tree algorithm (STA).

set spantree portpri *port-string priority* [*sid*]

NOTE: Path cost (**set spantree portcost**) takes precedence over port priority.

Syntax Description

port-string	Specifies the port(s) for which to set Spanning Tree port priority. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
priority	Specifies a number that represents the priority of a link in a Spanning Tree bridge. Valid values are from **0** to **240** (in increments of 16) with 0 indicating high priority and **240**, low priority.
sid	(Optional) Sets port priority for specific a SID.

Command Defaults

If *sid* is not specified, SID 0 will be assumed.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the priority of Fast Ethernet front panel port 3 to 240:

```
Matrix>set spantree portpri fe.0.3 240
```


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6.2.2.7 clear spantree portpri

Use this command to reset the bridge priority of a Spanning Tree port to the default value of 128.

clear spantree portpri [*port-string*] [*sid*]

Syntax Description

port-string	(Optional) Resets the priority for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
sid	(Optional) Resets the port priority for a specific SID.

Command Defaults

- If *port-string* is not specified, bridge priority will be reset for all ports.
- If *sid* is not specified, bridge priority will be reset on all SIDs.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the priority of Fast Ethernet front panel port 3 to 128:

```
Matrix>clear spantree portpri fe.0.3
```


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6.2.2.8 show spantree portcost

Use this command to display cost values assigned to one or more Spanning Tree ports.

show spantree portcost *port-string* [*sid*]

Syntax Description

port-string	Specifies the port(s) for which to display cost values. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
sid	(Optional) Displays cost values for a specific SID.

Command Defaults

If *sid* is not specified, path cost information for SID 0 will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port cost for Fast Ethernet front panel port 3:

```
Matrix>show spantree portcost fe.0.3
 Port cost = 64 for port fe.0.3.
```

6.2.2.9 set spantree portcost

Use this command to assign a cost value to a Spanning Tree or port. This parameter is used to determine the best path between Spanning Tree devices. Therefore, lower values should be assigned to ports attached to faster media, and higher values assigned to ports with slower media.

set spantree portcost *port-string cost* [*sid*]

NOTE: Port cost takes precedence over port priority (**set spantree portpri**). The cost to the root is updated by each bridge at the root port.

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Syntax Description

port-string	Specifies the port(s) to which to assign a cost value. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
cost	Specifies a cost value. Ranges are: • **0** to **65535** with legacy path cost enabled. • **0** to **200000000** with legacy path cost disabled. **NOTES:** A cost value of 0 will allow a port's default cost, which is based on link speed, to be used. If the link is part of a trunk, the sum of all link speeds in the trunk should be used as the cost value. For details on the **set legacypathcost** command, refer to Section 6.2.1.31.
sid	(Optional) Sets a cost value for a specific SID.

Command Defaults

If *sid* is not specified, SID 0 will be assumed.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set port cost to 25 on Fast Ethernet front panel port 11:

```
Matrix>set spantree portcost fe.0.11 25
```


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6.2.2.10 clear spantree portcost

Use this command to reset the path cost for a Spanning Tree or port to the default value of 0, allowing for path cost to be determined dynamically based on port speed.

clear spantree portcost [*port-string*] [*sid*]

Syntax Description

port-string	(Optional) Resets the path cost for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
sid	(Optional) Resets the cost value for a specific SID.

Command Defaults

- If *port-string* is not specified, path cost will be reset for all ports.
- If *sid* is not specified, port cost will be reset on all SIDs.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset port cost to 0 on Fast Ethernet front panel port 11:

```
Matrix>clear spantree portcost fe.0.11
```

6.2.2.11 show spantree adminedge

Use this command to display the edge port administrative status for a port.

show spantree adminedge *port-string*

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Syntax Description

port-string	Specifies the port(s) for which to display edge port administrative status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the edge port status for Fast Ethernet front panel port 3:

```
Matrix>show spantree adminedge fe.0.3
 admin edge = TRUE for port fe.0.3
```

6.2.2.12 set spantree adminedge

Use this command to set the edge port administrative status on a Spanning Tree port.

set spantree adminedge *port-string* {**true** | **false**}

Syntax Description

port-string	Specifies the edge port. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
true | **false**	Enables (**true**) or disables (**false**) the specified port as a Spanning Tree edge port.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set Fast Ethernet front panel port 11 as an edge port:

```
Matrix>set spantree adminedge fe.0.11 true
```

6.2.2.13 clear spantree adminedge

Use this command to reset the edge port status for one or more Spanning Tree ports to the default value of false.

clear spantree adminedge [*port-string*]

Syntax Description

port-string	(Optional) Resets edge port status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, edge port status will be reset for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset Fast Ethernet front panel port 24 as a non-edge port:

```
Matrix>clear spantree adminedge fe.0.24
```

6.2.2.14 show spantree spanguard

Use this command to display the status of the Spanning Tree span guard function.

show spantree spanguard

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Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the span guard function status:

```
Matrix>show spantree spanguard
 spanguard is currently disabled.
```

6.2.2.15 set spantree spanguard

Use this command to enable or disable the Spanning Tree span guard function. When enabled, this prevents an unauthorized bridge from becoming part of the active Spanning Tree topology. It does this by disabling a port that receives a BPDU when that port has been defined as an edge (user) port (as described in Section 6.2.2.12). This port will remain disabled until the amount of time defined by the **set spantree spanguardtimeout** (Section 6.2.2.18) has passed since the last seen BPDU or the port is manually unlocked (as described in Section 6.2.2.21).

set spantree spanguard {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the span guard function.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example
This example shows how to enable the span guard function:

```
Matrix>set spantree spanguard enable
```

6.2.2.16 clear spantree spanguard
Use this command to resets the status of the Spanning Tree span guard function to disabled.

clear spantree spanguard

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to reset the status of the span guard function to disabled:

```
Matrix>clear spantree spanguard
```

6.2.2.17 show spantree spanguardtimeout
Use this command to display the Spanning Tree span guard timeout setting.

show spantree spanguardtimeout

Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display the span guard timeout setting:

```
Matrix>show spantree spanguardtimeout
 spanguard timeout is set at 300 seconds.
```

6.2.2.18 set spantree spanguardtimeout

Use this command to set the amount of time (in seconds) an edge port will remain locked by the span guard function.

set spantree spanguardtimeout *timeout*

Syntax Description

timeout	Specifies a timeout value in seconds. Valid values are **0** (forever) to **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the span guard timeout to 600 seconds:

```
Matrix>set spantree spanguardtimeout 600
```

6.2.2.19 clear spantree spanguardtimeout

Use this command to reset the Spanning Tree span guard timeout to the default value of 300 seconds.

clear spantree spanguardtimeout

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Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the span guard timeout to 300 seconds:

```
Matrix>clear spantree spanguardtimeout
```

6.2.2.20 show spantree spanguardlock

Use this command to display the span guard lock status of one or more ports.

show spantree spanguardlock *port-string*

Syntax Description

port-string	Specifies the port(s) for which to show span guard lock status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the span guard lock status for Gigabit Ethernet front panel port 1:

```
Matrix>show spantree spanguardlock ge.0.1
 spanguard status for port ge.0.1 is UNLOCKED.
```

6.2.2.21 clear spantree spanguardlock

Use this command to unlock one or more ports locked by the Spanning Tree span guard function. When span guard is enabled, it locks ports that receive BPDUs when those ports have been defined as edge (user) ports (as described in Section 6.2.2.12).

clear spantree spanguardlock [*port-string*]

Syntax Description

port-string	(Optional) Unlocks specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, all span guard locked ports will be unlocked.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to unlock Fast Ethernet front panel port 16:

```
Matrix>clear spantree spanguardlock fe.0.16
```

6.2.2.22 show spantree spanguardtrapenable

Use this command to display the state of the Spanning Tree span guard trap function.

show spantree spanguardtrapenable

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Syntax Description
None.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display the state of the span guard trap function:

```
Matrix>show spantree spanguardtrapenable
 spanguard traps are enabled
```

6.2.2.23 set spantree spanguardtrapenable
Use this command to enable or disable the sending of an SNMP trap message when span guard detects that an unauthorized port has tried to join the Spanning Tree.

set spantree spanguardtrapenable {**disable** | **enable**}

Syntax Description

disable | **enable**	Disables or enables the span guard trap function.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to enable the span guard trap function:

```
Matrix>set spantree spanguardtrapenable enable
```


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6.2.2.24 clear spantree spanguardtrapenable

Use this command to reset the Spanning Tree span guard trap function back to the default state of disabled.

clear spantree spanguardtrapenable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the span guard trap function to disabled:

```
Matrix>clear spantree spanguardtrapenable
```

6.2.2.25 show spantree adminpoint

Use this command to display the administrative point-to-point status of the LAN segment attached to a port.

show spantree adminpoint *port-string*

Syntax Description

port-string	Specifies the port(s) for which to display point-to-point status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display the point-to-point status of the LAN segment attached to Fast Ethernet front panel port 3:

```
Matrix>show spantree adminpoint fe.0.3
 admin point-to-point = AUTO for port fe.0.3
```

6.2.2.26 set spantree adminpoint

Use this command to set the administrative point-to-point status of the LAN segment attached to a Spanning Tree port.

set spantree adminpoint *port-string* {**true** | **false** | **auto**}

Syntax Description

port-string	Specifies the port(s) for which to set point-to-point protocol status. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
true | **false** | **auto**	Specifies the point-to-point status of the LAN attached to the specified port. • **true** forces the port to be considered point-to-point. • **false** forces the port to be considered non point-to-point. • **auto** (the default setting) allows the firmware to determine the port's point-to-point status.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the LAN attached to Fast Ethernet front panel port 3 as a point-to-point segment:

```
Matrix>set spantree adminpoint fe.0.3 true
```

6.2.2.27 clear spantree adminpoint

Use this command to resets the point-to-point admin status to “auto” on one or more ports.

clear spantree adminpoint [*port-string*]

Syntax Description

port-string	(Optional) Resets point-to-point status on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, point-to-point status will be reset on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the point-to-point status of the LAN segment attached to Fast Ethernet front panel port 3 to auto:

```
Matrix>clear spantree adminpoint fe.0.3
```


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7

802.1Q VLAN Configuration

This chapter describes the VLAN configuration capabilities of the Matrix E1 device and how to use them to determine status, to add, change, or delete VLANs; assign ports to those VLANs, to classify frames to VLANs, to create a secure management VLAN, and configure the device for GVRP operation. The device can support up to 1024 802.1Q VLANs. The allowable range for VLANs is 2 to 4094. As a default, all ports on the device are assigned to VLAN ID 1, untagged.

7.1 VLAN CONFIGURATION SUMMARY

Network devices can be logically grouped into VLANs even if they span long physical distances over a vast, intricate physical network. The VLAN set of commands allows such VLANs to be configured on a network at the switched port of the Matrix E1. Also, some or all of the ports on the device can be configured as GVRP ports, which enable frames received with a particular VLAN ID and protocol to be transmitted on a limited number of ports. This keeps the traffic associated with a particular VLAN and protocol isolated from the other parts of the network.

7.1.1 Port Assignment Scheme

For information on this device's port assignment scheme, refer to Section 4.1.1.

7.1.2 Port String Syntax Used in the CLI

For information on how to designate port numbers in the CLI syntax, refer to Section 4.1.2.

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7.2 PROCESS OVERVIEW: 802.1Q VLAN CONFIGURATION

Use the following steps as a guide to configure VLANs on the device (refer to the associated section in parentheses):

1. Review existing VLANs (Section 7.3.1)
2. Create and name VLANs (Section 7.3.2)
3. Assign port VLAN IDs and Ingress Filtering (Section 7.3.3)
4. Configure VLAN Egress (Section 7.3.4)
5. Assign VLANs according to classification rules (Section 7.3.5)
6. Filter (drop) incoming frames according to classification rule (Section 7.3.5)
7. Set the host VLAN (Section 7.3.6)
8. Create a secure management VLAN (Section 7.3.7)
9. Enable / Disable GVRP (GARP VLAN Registration Protocol) (Section 7.3.8)

Preparing for VLAN Configuration

A little forethought and planning is essential to a good VLAN implementation. Before attempting to configure a single device for VLAN operation, consider the following:

- How many VLANs will be required?
- What stations will belong to them?
- What ports are connected to those stations?
- What ports will be configured as GVRP-aware ports?

It is also helpful to sketch out a diagram of your VLAN strategy.

NOTES: Before you can use the Matrix E1 device for IP routing, you must dedicate two or more VLANs as IP routing uplinks. To do this, you must:

- Disable Spanning Tree on the ports to be dedicated as routing uplinks, as described in Chapter 6, **Spanning Tree Configuration**.
- Create new VLANs from these dedicated ports, as described in this chapter.
- In router mode, assign IP addresses to the new VLANs, as described in Chapter 12, **IP Configuration**.

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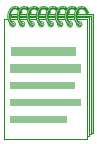
7.3 VLAN CONFIGURATION COMMAND SET

7.3.1 Reviewing Existing VLANs

Purpose

To see a list of the current VLANs configured on the device, their VLAN type, the VLAN attributes related to one or more ports, and the ports on a VLAN egress list. The device uses the VLAN egress list to keep track of all VLANs that it will recognize. Depending on the command used, you can see a list of all VLANs (dynamic and static) or just the static VLANs.



NOTE: Static VLANs are those VLANs created manually -- using the commands described in this section, SNMP, or WebView.

Commands

The commands needed to configure Static VLANs are listed below and described in the associated section as shown.

- show vlan (Section 7.3.1.1)
- show vlan static (Section 7.3.1.2)
- show vlan portinfo (Section 7.3.1.3)

7.3.1.1 show vlan

Use this command to display all information related to a specific VLAN or all VLANs known to the device (static and dynamic).

show vlan [**detail**] [*vlan-list* | *vlan-name*]

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Syntax Description

detail	(Optional) Displays detailed attributes of one or more VLANs.
vlan-list | *vlan-name*	(Optional) Displays information for specific VLAN(s). For VLAN name to display, it must first be set using the **set vlan name** command. For details, refer to Section 7.3.2.2.

Command Defaults

- If **detail** is not specified, summary information will be displayed.
- If *vlan-list* or *vlan-name* are not specified, information for all VLANs will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display information for all VLANs. In this case, there is only one VLAN, the default VLAN 1. This display shows that VLAN 1 is the default VLAN and it is enabled to operate. There are 48 Fast Ethernet ports in its port egress list, which are configured to transmit untagged frames. There are no VLAN 1 forbidden ports:

```
Matrix>show vlan
 VLAN:    1     Name: DEFAULT                              Status: enabled
 Egress Ports
fe.0.1-48
 Forbidden Egress Ports
 None
 Untagged Ports
fe.0.1-48
```

This example shows how to display the information for VLAN 7 only. In this case, VLAN 7 has a VLAN name of green and it is enabled. Fast Ethernet front panel ports 5 through 10, 12, and 30 are

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in VLAN 7 port egress list and are configured to transmit frames tagged as VLAN 7 frames. There are no VLAN 7 forbidden ports:

```
Matrix>show vlan 7
 VLAN:    7     Name: green                              Status: enabled
 Egress Ports
fe.0.5-10, fe.0.12, fe.0.30
 Forbidden Egress Ports
 None
 Untagged Ports
 None
```

This example shows how to display detailed attributes of all VLANs known to the device. In this case, 17 VLANs have been created, either statically or dynamically through GVRP (GARP VLAN Registration Protocol). For more information on creating static VLANs, refer to Section 7.3.2.1. For more information on configuring GVRP, refer to Section 7.3.8. VLANs can also be automatically created when dynamic egress is enabled as described in Section 7.3.4.6:

```
Matrix>show vlan detail
 Number of vlans: 17
 Number of vlans deleted: 172

     Vlan   Type                Status
----------------------------------------
      1     Static              enabled
     10     GVRP                enabled
     11     GVRP                enabled
     12     GVRP                enabled
     13     GVRP                enabled
     14     GVRP                enabled
     15     GVRP                enabled
     16     GVRP                enabled
     17     GVRP                enabled
     18     GVRP                enabled
     19     GVRP                enabled
     20     GVRP                enabled
    510     GVRP                enabled
    520     GVRP                enabled
    530     GVRP                enabled
   4000     GVRP                enabled
   4094     GVRP                enabled
```


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7.3.1.2 show vlan static

Use this command to display all information related to a specific static VLAN or all static VLANs known to the device. Static VLANs are those VLANs that you have manually created using this command set, SNMP MIBs, or the WebView management application.

show vlan static [*vlan-list* | *vlan-name*]

Syntax Description

vlan-list | *vlan-name*	(Optional) Displays specific VLAN(s). For VLAN name to display, it must first be set using the **set vlan name** command. For details, refer to Section 7.3.2.2.

Command Defaults

If *vlan-list* or *vlan-name* are not specified, information for all static VLANs will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows that the static VLAN 7 has the name green and is enabled to operate. Fast Ethernet front panel ports 5 through 10, 12, and 30 are in the VLAN 7 port egress list and configured to transmit frames tagged as VLAN 7 frames:

```
Matrix>show vlan static 7
 VLAN:    7     Name: green                              Status: enabled
 Egress Ports
fe.0.5-10, fe.0.12, fe.0.30
 Forbidden Egress Ports
 None
 Untagged Ports
 None
```


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7.3.1.3 show vlan portinfo

Use this command to display VLAN attributes related to one or more ports.

show vlan portinfo [**vlan** *vlan-list* | *vlan-name*] [**port** *port-string*]

Syntax Description

vlan *vlan-list* | *vlan-name*	(Optional) Displays specific VLAN(s). For VLAN name to display, it must first be set using the **set vlan name** command. For details, refer to Section 7.3.2.2.
port *port-string*	(Optional) Displays the VLAN list for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

- If *vlan-list* or *vlan-name* are not specified, information for all static VLANs will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display VLAN information related to all Gigabit Ethernet ports. In this case, all six ports ge.0.1-5 are still assigned to VLAN 1, the default VLAN. Ingress filtering has not been enabled. Ports ge.0.1-5 are assigned to transmit untagged frames for the default VLAN only, while, port ge.0.6 is also configured to transmit tagged frames for VLANs 510, 520, 530, 4000 and 4094:

```
Matrix>show vlan portinfo ge*.*
     Port             Ingress     Egress
                Vlan   Filter       Vlan
-------------------------------------------------------------------
  ge.0.1          1      N     untagged: 1
  ge.0.2          1      N     untagged: 1
  ge.0.3          1      N     untagged: 1
  ge.0.4          1      N     untagged: 1
  ge.0.5          1      N     untagged: 1
  ge.0.6          1      N     untagged: 1
                                 tagged: 510,520,530,4000,4094
```


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7.3.2 Creating and Naming Static VLANs

Purpose

To create a new static VLAN, or enable/disable the new or other existing static VLANs.

Commands

The commands needed to establish new or remove VLANs are listed below and described in the associated section as shown.

- set vlan (Section 7.3.2.1)
- set vlan name (Section 7.3.2.2)
- clear vlan (Section 7.3.2.3)
- clear vlan name (Section 7.3.2.4)

7.3.2.1 set vlan

Use this command to create a new static IEEE 802.1Q VLAN, or to enable or disable an existing VLAN. When a new VLAN is created, it is added to the list of VLANs that the device will recognize. Once a VLAN is created, you can assign it a name using the **set vlan name** command described in Section 7.3.2.2.

set vlan {**create** | **enable** | **disable**} *vlan-list*

NOTE: Each VLAN ID must be unique. If a duplicate VLAN ID is entered, the device assumes that the Administrator intends to modify the existing VLAN.

Enter the VLAN ID using a unique number between 2 and 4094. The VLAN IDs of 0, 1, and 4095 and higher may not be used for user-defined VLANs.

Syntax Description

create | **enable** | **disable**	Creates, enables or disables a VLAN.
vlan-list	Specifies the number of the VLAN(s) to be created, enabled or disabled.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and previous)

set vlan *vlan-list* {**create** | **enable** | **disable**}

Examples

This example shows how to create VLAN 3:

```
Matrix>set vlan create 3
```

This example shows how to disable VLAN 3:

```
Matrix>set vlan disable 3
```

7.3.2.2 set vlan name

Use this command to set the ASCII name for a new or existing VLAN. Once set, you can use the *vlan-name* interchangeably with the *vlan-id* in the **show vlan**, **show vlan static** and **show vlan dynamicegress** commands.

set vlan name *vlan-id* | *vlan-name*

Syntax Description

vlan-id	Specifies the VLAN to be named.
vlan-name	Specifies the string used as the name of the VLAN (1 to 32 characters).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the name for VLAN 7 to green:

```
Matrix>set vlan name 7 green
```

7.3.2.3 clear vlan

Use this command to remove one or more static VLANs from the list of VLANs recognized by the device.

clear vlan *vlan-list*

Syntax Description

vlan-list	Specifies the VLAN(s) to be removed.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove a static VLAN 9 from the device's VLAN list:

```
Matrix>clear vlan 9
```


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7.3.2.4 clear vlan name

Use this command to remove the name of a VLAN from the VLAN list.

clear vlan name *vlan-id*

Syntax Description

vlan-id	Specifies the number of the VLAN associated with the VLAN name to be cleared.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the name for VLAN 9:

```
Matrix>clear vlan name 9
```


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7.3.3 Assigning Port VLAN IDs (PVIDs) and Ingress Filtering

Purpose

To assign default VLAN IDs to untagged frames on one or more ports. Using **set port vlan** you can, for example, assign ports 1, 5, 8, and 9 to VLAN 3. Untagged frames received on those ports will be assigned to VLAN 3. (By default, all ports are members of VLAN ID 1, the default VLAN.)

However, if VLAN classification is enabled and the received frame matches a classification rule, the frame is assigned to the Port VLAN ID defined in the classification rule and not the Port VLAN ID assigned to the port. VLAN classification takes precedence over the PVID.

Commands

The commands associated with configuring port VLAN IDs are listed below and described in the associated section as shown.

- show port vlan (Section 7.3.3.1)
- set port vlan (Section 7.3.3.2)
- clear port vlan (Section 7.3.3.3)
- show port ingress filter (Section 7.3.3.4)
- set port ingress filter (Section 7.3.3.5)

7.3.3.1 show port vlan

Use this command to display which VLANs are on one or all port VLAN lists.

show port vlan [*port-string*]

Syntax Description

port-string	(Optional) Displays the VLAN list for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port _string* is not specified, all port VLAN information will be displayed.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display port VLAN lists for Fast Ethernet front panel ports 1 through 5. It shows they are on the port VLAN list of VLAN 1:

```
Matrix>show port vlan fe.0.1-5
 Port fe.0.1 has a port VLAN ID of 1.
 Port fe.0.2 has a port VLAN ID of 1.
 Port fe.0.3 has a port VLAN ID of 1.
 Port fe.0.4 has a port VLAN ID of 1.
 Port fe.0.5 has a port VLAN ID of 1.
```

7.3.3.2 set port vlan

Use this command to configure the PVID (port VLAN identifier) for one or more ports.

set port vlan *port-string vlan-id*

NOTE: The PVID is used to classify untagged frames as they ingress into a given port. When setting a PVID with the **set port vlan** command, you can also add the port to the VLAN's untagged egress list.

Syntax Description

port-string	Specifies the port(s) for which to configure a VLAN identifier. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
vlan-id	Specifies the VLAN to which port(s) will be added.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to add Fast Ethernet front panel port 10 to the port VLAN list of VLAN 4 (PVID 4). It also shows how port fe.0.10 is added to that VLAN's untagged egress list:

```
Matrix>set port vlan fe.0.10 4

 The PVID is used to classify untagged frames as they
ingress into a given port. Would you like to add the selected
port(s) to this vlan's untagged egress list and remove them
from all other vlans untagged egress list(y/n) [n]?
NOTE: choosing 'y' will not remove the port(s) from previously
configured tagged egress lists.y

Matrix>clear vlan egress 1 fe.0.10
Matrix>
Matrix>set vlan egress 4 fe.0.10 untagged
```

7.3.3.3 clear port vlan

Use this command to reset the port's 802.1Q port VLAN ID to the host VLAN ID 1.

clear port vlan *port-string*

Syntax Description

port-string	Specifies the port(s) to reset to the host VLAN ID 1. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the Fast Ethernet front panel ports 3 and 11 to a VLAN ID of 1 (Host VLAN):

```
Matrix>clear port vlan fe.0.3,fe.0.11
```


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7.3.3.4 show port ingress filter

Use this command to show all ports that are enabled for port ingress filtering, which limits incoming VLAN ID frames according to a port VLAN egress list. If the port is not on the port VLAN egress list of the VLAN ID indicated in the incoming frame, then that frame is dropped and not forwarded. The device port ingress list is created using the **set port ingress** command described in Section 7.3.3.5.

show port ingress filter [*port-string*]

Syntax Description

port-string	(Optional) Displays ingress filtering status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, ingress filtering status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port ingress filter status to see which of the front panel ports 10 through 15 are enabled or disabled for port ingress filtering:

```
Matrix>show port ingress filter fe.0.10-15
   Port      State
 --------  ---------
  fe.0.10  disabled
  fe.0.11  disabled
  fe.0.12  disabled
  fe.0.13  disabled
  fe.0.14  disabled
  fe.0.15  disabled
```


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7.3.3.5 set port ingress filter

Use this command to limit the forwarding of received VLAN tagged frames on a port to the frames with VLAN IDs that match that port's membership on port VLAN egress lists.

When ingress filtering on a port is enabled, the VLAN IDs of incoming frames on a received port are compared to the received ports on the egress list of that VLAN. If the received port does not belong to that frame's VLAN egress list, then the frame is dropped.

Ingress filtering is implemented according to the IEEE 802.1Q standard.

set port ingress filter *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) to add to the device's port ingress list. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	Enables or disables the port ingress filter function on the specified port(s).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable port ingress filtering on Fast Ethernet front panel port 3:

```
Matrix>set port ingress filter fe.0.3 disable
```


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7.3.4 Configuring the VLAN Egress List

Purpose

To assign or remove ports on the VLAN egress list for the device. This determines which ports will transmit frames of a particular VLAN. For example, ports 1, 5, 9, 8 could be assigned to transmit frames with VLAN ID=5.

The port egress type for all ports defaults to tagging transmitted frames, but can be changed to forbidden or untagged. Setting a port to forbidden prevents it from participating in the specified VLAN and ensures that any dynamic requests (either through GVRP or dynamic egress) for the port to join the VLAN will be ignored. Setting a port to untagged allows it to transmit frames without a tag header. This setting is usually used to configure a port connected to an end user device.

Commands

The commands used to configure VLAN egress and dynamic VLAN egress are listed below and described in the associated section as shown.

- set vlan forbidden (Section 7.3.4.1)
- show port egress (Section 7.3.4.2)
- set vlan egress (Section 7.3.4.3)
- clear vlan egress (Section 7.3.4.4)
- show vlan dynamicegress (Section 7.3.4.5)
- set vlan dynamicegress (Section 7.3.4.6)

7.3.4.1 set vlan forbidden

Use this command to prevent one or more ports from participating in a VLAN. This setting instructs the device to ignore dynamic requests (either through GVRP or dynamic egress) for the port to join the VLAN.

set vlan forbidden *vlan-id port-string*

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Syntax Description

vlan-id	Specifies the VLAN for which to set forbidden port(s).
port-string	Specifies the port(s) to set as forbidden for the specified *vlan-id*. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows you how to set Fast Ethernet port 3 to forbidden for VLAN 6:

```
Matrix>set vlan forbidden 6 fe.0.3
```

7.3.4.2 show port egress

Use this command to display the VLAN membership for one or more ports.

show port egress [*port-string*]

Syntax Description

port-string	(Optional) Displays VLAN membership for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, VLAN membership will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows you how to show VLAN egress information for front panel Fast Ethernet ports 1 through 3. In this case, all three ports are allowed to transmit VLAN 1 frames as tagged and VLAN 10 frames as untagged. Both are static VLANs:

```
Matrix>show port egress fe.0.1-3
 Port      Vlan          Egress     Registration
Number      Id           Status       Status
-------------------------------------------------------
fe.0.1       1            tagged       static
fe.0.1      10          untagged      static
fe.0.2       1            tagged       static
fe.0.2      10          untagged      static
fe.0.3       1            tagged       static
fe.0.3      10          untagged      static
```

7.3.4.3 set vlan egress

Use this command to add ports to one or more VLAN egress lists for the device. This determines which ports will transmit frames for a particular VLAN.

set vlan egress *vlan-list port-string* [**untagged**]

Syntax Description

vlan-list	Specifies the VLAN(s) where port(s) will be added to the egress list.
port-string	Specifies port(s) to add to the VLAN egress list of the specified *vlan-id*. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
untagged	(Optional) Adds the specified ports as untagged ports. This allows the port to transmit frames that do not include an IEEE 802.1Q header tag.

Command Defaults

If **untagged** is not specified, the port will be added to the VLAN egress list as able to transmit 802.1Q tagged frames.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to add front panel Fast Ethernet ports 5 through 10 to the egress list of VLAN 7. This means that these ports will transmit VLAN 7 frames:

```
Matrix>set vlan egress 7 fe.0.5-10
```

7.3.4.4 clear vlan egress

Use this command to remove ports from one or more VLAN egress lists.

clear vlan egress *vlan-list port-string*

Syntax Description

vlan-list	Specifies the VLAN(s) from which port(s) will be removed from the egress list.
port-string	Specifies port(s) to remove from the VLAN egress list of the specified *vlan-id*. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to remove Fast Ethernet port 1 on expansion module 3 from the egress list of VLANs 2 and 9:

```
Matrix>clear vlan egress 2,9 fe.3.1
```


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This example shows how to remove all Fast Ethernet ports on expansion module 2 from the egress list of VLAN 4:

```
Matrix>clear vlan egress 4 fe.2.*
```

7.3.4.5 show vlan dynamic egress

Use this command to display which VLANs are currently enabled for VLAN dynamic egress.

show vlan dynamicegress [*vlan-id* | *vlan-name*]

Syntax Description

vlan-id | *vlan-name*	(Optional) Displays dynamic egress status for a specific VLAN ID or VLAN name.

Command Defaults

If *vlan-id* or *vlan-name* is not specified, status for all VLANs where dynamic egress is enabled will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to determine that dynamic VLAN egress is currently enabled for VLANs 10, 100, and 3072:

```
Matrix>show vlan dynamicegress
Dynamic Vlan Egress Status:
Vlan Id       Status
-------       --------
10            enabled
100           enabled
3072          enabled
```


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7.3.4.6 set vlan dynamicegress

Use this command to set the administrative status of the VLAN's dynamic capability. If VLAN dynamic egress is enabled, the device will add the port receiving a tagged frame to the VLAN egress list of the port according to the frame VLAN ID. If the VLAN does not exist, it is created.

set vlan dynamicegress *vlan-id* {**enable** | **disable**}

Syntax Description

vlan-id	Specifies the number of the VLAN on which to enable or disable dynamic egress.
enable | **disable**	Enables or disables dynamic egress.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the dynamic egress function on VLAN 7:

```
Matrix>set vlan dynamicegress 7 enable
```


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7.3.5 Assigning VLANs According to Classification Rules

Important Notice

In addition to the commands described in this section, Matrix E1 (1G58x-09 and 1H582-xx) devices with firmware versions 2.05.xx and higher also support policy profile-based classification to a VLAN or Class of Service. Policy classification commands that can be used alternatively to VLAN classification commands are noted in the appropriate sections under the heading "Command Alternative (v2.05.xx and higher)". For a description of the complete policy classification command set, refer to Chapter 8.

Purpose

To perform the following:

- Assign incoming untagged frames to a specific VLAN according to the parameters in created classification rules. Only untagged frames are classified.
- Drop untagged frames according to a VLAN based on Layer 2/3/4 of a received frame.
- Display the VLAN ID (VID), protocol classification, and description of each classification of the current entries.
- Add/delete a VID and associated classification entry.

Commands

The commands used to assign VLANs to classification rules are listed below and described in the associated section as shown.

- show vlan classification (Section 7.3.5.1)
- set vlan classification (Section 7.3.5.2)
- clear vlan classification (Section 7.3.5.5)
- set vlan classification ingress (Section 7.3.5.6)
- clear vlan classification ingress (Section 7.3.5.7)

7.3.5.1 show vlan classification

Use this command to display the VLAN ID (VID), protocol classification, and description of each classification of the current entries.

show vlan classification

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Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Alternative (v2.05.xx and higher)

show policy class (Section 8.3.2.1)

Example

This example shows that the VLAN classification function is enabled, and that two VLAN classifications have been configured on the device:

```
Matrix>show vlan classification
 VLAN Classification enabled.

Vlan Classification Entries
-------------------------------
Vlan ID: 5, Src UDP Range: 45-53, Status: enabled,
 Action Status: Forward No Frames
 Port List: None
----------
Vlan ID: 7, Ethernet II Type: IP, Status: enabled,
 Action Status: Forward All Frames
 Port List: None
```

7.3.5.2 set vlan classification

Use this command to

- assign or contain frames according to classification rule,
- enable or disable the global classifier on the device,
- create a rule that will assign untagged traffic to a VLAN based on Layer 2/3/4 classification rules, and
- enable or disable a classification rule associated with a VLAN.

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set vlan classification *vlan-id data_meaning data_value* [*data_mask*] {**create** | **enable** | **disable**}

Syntax Description

vlan-id	Specifies the number of the VLAN on which to apply the classification rule. Valid values and associated actions are: • **4095**: permits these frames to forward on all VLANs. • **0**: denies and discards these frames for all VLANs. • **1**: classifies these frames the default VLAN. • **2 - 4094**: classifies these frames to the specified VLAN.
data_meaning	Specifies the parameter used to classify or filter frames. Refer to Table 7-1 and Table 7-2 for lists of supported *data_meanings* and associated protocol types and classifications.
data_value	Specifies the code for a predefined classifier. This value is dependent on the classification entered, as stated in Table 7-1 and Table 7-2. This information must be entered for each classifier associated with that protocol.
data_mask	(Not required for most data values.) Specifies a value dependent on the *data_value* entered. For details, refer to Table 7-2.

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create | **enable** | **disable**	**create** - Creates a new classification rule that will be applied to the *vlan-id*. **enable** - If a classification rule is not entered in this command, this entry enables the global classifier in the device so that VLAN classification rules may be implemented. **NOTE:** Classification rules are automatically enabled when created. **disable** - If a classification rule is not entered in this command, this entry disables the global classifier in the device so that VLAN classification rules may not be implemented. If a classification rule is entered in this command, this entry disables that VLAN classification rule for the designated VLAN.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 7-2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and higher)

set policy classify (Section 8.3.2.2)

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Examples

This example shows how to

- enable the global classifier so that VLAN classification rules may be implemented,
- use Table 7-1 to create (and enable) a classification rule for classifying Ethernet II Type IP frames to VLAN 7:

```
Matrix>set vlan classification enable
Matrix>set vlan classification 7 ethernet-II-type ip create
```

This example shows how to use Table 7-2 to disable a VLAN 5 classification rule for filtering out (dropping) any Source UDP frames with a port range of 45 to 53:

```
Matrix>set vlan classification 5 src-udp-range 45 53 disable
```

7.3.5.3 Valid Values for VLAN Classification and Frame Filtering

The following tables provide parameters for classifying a frame to a VLAN or filtering (dropping) untagged frames received on a VLAN.

Table 7-1 provides the **set vlan classification** *data_meaning* parameters that can be entered to classify frames into a VLAN, and the *data_values* that can be entered for each classifier associated with those parameters. Values applied are listed next to each *data_value* keyword.

Table 7-2 provides the **set vlan classification** *data_meaning* parameters that can be entered to filter (drop) untagged frames, and the *data_values* that can be entered for each classifier associated with those parameters. When applicable, *data_masks* are also listed for each *data_value*. The parameters in this table do NOT classify frames into a specific VLAN. Untagged frames received with any of the *data_meanings* listed in this table will be dropped and not forwarded.

NOTES: Classification *data_meanings* and *data_values* are NOT case sensitive.

Hyphens in parameters must be entered as shown.

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Table 7-1 Valid Values for VLAN Classification

***data_meaning* keywords**	***data_value* keywords (value applied)**	***data_ mask***
Ethernet-II-Type	• **05F6 - FFFF (**valid range) • **AppleTalk (**809B) • **Banyan-Vines (**0BAD) • **DECNET (**6003) • **IP (**0800 and 0806) • **IPX (**8137) • **RARP (**8035)	Not applicable.
NOTES: The Matrix E1 allows the use of 3 user defined Ethernet II Type values for classification into a VLAN. AppleTalk, Banyan-Vines and RARP are considered user defined, but are listed as options. Additional user defined Ethernet II Type values will filter (drop) untagged frames as described in Table 7-2. IP and DECNET rules also classify the SNAP frame type.		
802.3-SAP	• **IPX-LLC** (E0E0) • **IPX-RAW** (FFFF) • **IPX-SNAP** (AAAA) • **Netbios** (F0F0) • **SNA** (0000, 0404, 0808 and 0C0C)	Not applicable.

Table 7-2 Valid Values for VLAN Frame Filtering

NOTE: The parameters in this table DO NOT classify frames into a specific VLAN, Untagged frames received with any of the *data_meanings* listed below will be dropped and not forwarded.

data_meaning	***data_value(s)***	***data_ mask***
IP-TOS (Type of Service)	Integer (**0 - 255**)	Not applicable

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Table 7-2 Valid Values for VLAN Frame Filtering (Continued)

IP-Protocol-Type	• Integer (**0 - 255**) • **ICMP** • **IGMP** • **OSPF** • **TCP** • **UDP**	Not applicable.
IPX-COS (Class of Service)	Integer (**0 - 255**)	Not applicable.
IPX-Packet-Type	• **0** = **Hello-or-SAP** • **1** = **RIP** • **2** = **Echo-Packet** • **3** = **Error-Packet** • **4** = **Netware-386-or-SAP** • **5** = **Sequenced-Packet-Protocol** • **16 - 31** = Experimental Protocols • **17 = Netware-286**	Not applicable.
data_meaning	***data_value(s)***	***data_ mask***
IP Address Group: **Src-IP-Address** **Dest-IP-Address** **Bil-IP-Address**	IP Address in dotted decimal format: **000.000.000.000**	Data mask in dotted decimal format: **000.000.000.000**
NOTE: While the distinction of Source/Destination/Bilateral makes entries with the same IP Address, Network Number, Port Range, or MAC address unique, only one entry from this and similar groups in this table may exist for a given address or port designation. Additional entries will fail.		
IPX Network Group: **Src-IPX-Network** **Dest-IPX-Network** **Bil-IPX-Network**	IPX Network Num: 0x**00000000**	Not applicable.

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Table 7-2 Valid Values for VLAN Frame Filtering (Continued)

UDP Port Group: **Src-UDP-Port** **Dest-UDP-Port** **Bil-UDP-Port**	• Integer (**0 - 65535**) • **BootP-Client** • **BootP-Server** • **DNS** • **FTP** • **FTP-Data** • **HTTP** • **IMAP2** • **IMAP3** • **Netbios-Datagram** • **Netbios-Name-Server** • **Netbios-Sess-Server** • **POP3** • **RIP** • **Smart-Voice-Gateway** • **SMTP** • **Telnet** • **TFTP**	Not applicable.
data_meaning	***data_value(s)***	***data_ mask***
TCP Port Group: **Src-TCP-Port** **Dest-TCP-Port** **Bil-TCP-Port**	Same selection as for UDP Port Group	Not applicable.
IPX Socket Group: **Src-IPX-Socket** **Dest-IPX-Socket** **Bil-IPX-Socket**	• Integer (**0 - 65535**) • **Diagnostics** • **IPX-WAN** • **NCP** • **Netbios** • **NLSP** • **RIP** • **SAP**	Not applicable.

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Table 7-2 Valid Values for VLAN Frame Filtering (Continued)

MAC Address Group: **Src-MAC-Address** **Dest-MAC-Address** **Bil-MAC-Address**	MAC Address: **00-00-00-00-00-00**	Data mask bits
UDP Range Group: **Src-UDP-Range** **Dest-UDP-Range** **Bil-UDP-Range**	Lower boundary of port range: **(0 - 65535)**	Upper boundary of port range: **(0 - 65535)**
TCP Range Group: **Src-TCP-Range** **Dest-TCP-Range** **Bil-TCP-Range**	Lower boundary of port range: **0 - 65535**	Upper boundary of port range: **0 - 65535**

7.3.5.4 Classification Precedence Rules

NOTE: It is important that you have a comprehensive understanding of the precedence concept before configuring the Matrix E1 device, as these rules can have a significant impact on the network operation.

When there are multiple classification rules assigned to a Matrix E1 device, the device must determine which classification rule takes precedence according to classification precedence rules.

Table 7-3 lists the ISO Layer, associated classification, and precedence levels.

NOTE: In Table 7-3, the following applies:

- Exact Match indicates a match of an explicitly defined address.
- Best Match indicates a match of an entire subnet, or range of addresses within a subnet.

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Table 7-3 Classification Precedence

Classification Type (IP)	Default Precedence Level
802.1Q frame tag received	1
Source MAC Address Best Match	2
Destination MAC Address Best Match	3
Source IP Address Exact Match	4
Source IP Address Best Match (Subnet)	5
Destination IP Address Exact Match	6
Destination IP Address Best Match (Subnet)	7
UDP / TCP Port Source	8
UDP / TCP Port Destination	9
IP TOS	10
IP Type	11
Protocol Type (Ether Type or DSAP/SSAP)	12
Receive Port	13
Classification Type (IPX)	**Default Precedence Level**
802.1Q frame tag received	1
Source MAC Address Best Match	2
Destination MAC Address Best Match	3
Source IPX Network Number	4
Destination IPX Network Number	5
IPX Source Socket	6
IPX Destination Socket	7

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Table 7-3 Classification Precedence (Continued)

IPX Class of Service	8
IPX Type	9
Protocol Type (Ether Type or DSAP/SSAP)	10
Receive Port	11

7.3.5.5 clear vlan classification

Use this command to clear a VLAN classification entry.

clear vlan classification *vlan-id data_meaning data _value* [*data_mask*]

Syntax Description

vlan-id	Specifies the number of the VLAN associated with the classification to be cleared.
data_meaning	Specifies the *data_meaning* of the classification to be cleared. Refer to Table 7-1 and Table 7-2 for lists of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the *data_value* of the classification to be cleared. The range of values is dependent on the *data_meaning*. Refer to Table 7-1 and Table 7-2 for the limitations.
data_mask	(Not required for most data values.) This entry is dependent on the *data_value* entered. For details, refer to Table 7-2.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 7-2.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Alternative (v2.05.xx and higher)

clear policy class (Section 8.3.2.4)

Example

This example shows how to clear the Ethernet II Type IP classification rule associated with VLAN 7:

```
Matrix>clear vlan classification 7 ethernet-II-type ip
```

7.3.5.6 set vlan classification ingress

Use this command to add ports to a VLAN classification rule. Ports added will now be active for this rule. Untagged frames received will be tagged according to the VLAN classification rule.

set vlan classification ingress *vlan-id port-string data_meaning data_value* [*data_mask*]

Syntax Description

vlan-id	Specifies the number of the VLAN that will be associated with the new classification.
port-string	Specifies the port(s) to add to the new classification rule. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
data_meaning	Specifies the *data_meaning* for the parameter used to classify or filter frames. Refer to Table 7-1 and Table 7-2 for lists of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of values is dependent on the *data_meaning*. Refer to Table 7-1 and Table 7-2 for the limitations.
data_mask	(Not required for most data values.) This entry is dependent on the *data_value* entered. For details, refer to Table 7-2.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 7-2.

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Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and higher)

set policy port (Section 8.3.3.2)

Examples

This example shows how to assign IP traffic received on Fast Ethernet front panel ports 5 through 15 to the IP VLAN (VLAN 7):

```
Matrix>set vlan classification ingress 7 fe.0.5-15 ethernet-II-type ip
```

This example shows how to drop all Source UDP traffic received on Fast Ethernet front panel ports 5 through 10 from source UDP (sockets) 45 to 53. This would be accomplished by assigning the frames to a discard VLAN (in this example VLAN ID 5), which will result in dropping the frames.

```
Matrix>set vlan classification ingress 5 fe.0.5-10 src-udp-range 45 53
```

7.3.5.7 clear vlan classification ingress

Use this command to remove ports from a VLAN classification rule.

clear vlan classification ingress *vlan-id port-string data_meaning data_value* [*data_mask*}

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Syntax Description

vlan-id	Specifies the number of the VLAN to remove from the classification rule.
port-string	Specifies the port(s) to remove from the classification rule. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
data_meaning	Specifies the *data_meaning* for the parameter used to classify or filter frames. Refer to Table 7-1 and Table 7-2 for lists of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of values is dependent on the *data_meaning*. Refer to Table 7-1 and Table 7-2 for the limitations.
data_mask	(Not required for most data values.) This entry is dependent on the *data_value* entered. For details, refer to Table 7-2.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 7-2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and higher)

clear policy port (Section 8.3.3.3)

Example

This example shows how to remove Fast Ethernet front panel port 21 from the Source UDP Range classification rule to filter out (drop) incoming frames:

```
Matrix>clear vlan classification ingress 6 fe.0.21 src-udp-range 45 53
```


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7.3.6 Setting the Host VLAN

Purpose

To configure a host VLAN that only select devices are allowed to access. This secures the host port for management-only tasks.

NOTE: The host port is the management entity of the device.

Commands

The commands needed to configure host VLANs are listed below and described in the associated section as shown.

- show host vlan (Section 7.3.6.1)
- set port vlan host (Section 7.3.6.2)
- clear host vlan (Section 7.3.6.3)

7.3.6.1 show host vlan

Use this command to display the current host VLAN.

show host vlan

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the host VLAN:

```
Matrix>show host vlan
  Host vlan is 7.
```

7.3.6.2 set port vlan host

Use this command to assign host status to a VLAN. The host VLAN should be a secure VLAN where only designated users are allowed access. For example, a host VLAN could be specifically created for device management. This would allow a management station connected to the management VLAN to manage all ports on the device and make management secure by preventing management via ports assigned to other VLANs.

set port vlan host *vlan-id*

NOTE: Before you can designate a VLAN as the host VLAN, you must create a VLAN using the set of commands described in Section 7.3.2.

Syntax Description

vlan-id	Specifies the number of the VLAN to set as the host VLAN.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and previous)

set host vlan *vlan-id*

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Example

This example shows how to set VLAN 7 as the host VLAN:

```
Matrix>set port vlan host 7
```

7.3.6.3 clear host vlan

Use this command to reset the host VLAN to the default setting of 1.

clear host vlan

Syntax Description

None.

Command Defaults

None.

Command Type

Switch Command.

Command Mode

Read-Write.

Example

This example shows how to set the host VLAN to the default setting:

```
Matrix>clear host vlan
```


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7.3.7 Creating a Secure Management VLAN

If the Matrix E1 is to be configured for multiple VLANs, it may be desirable to configure a management-only VLAN. This allows a station connected to the management VLAN to manage all ports on the device. It also makes management secure by preventing configuration via ports assigned to other VLANs.

To create a secure management VLAN, you must:

1. Create and name a new VLAN. (Section 7.3.2)
2. Set the new VLAN as the host VLAN. (Section 7.3.6)
3. Set a private community name and access policy. (Section 5.2.2.8).

The commands needed to create a secure management VLAN are listed in Table 7-4 and described in the associated section as shown.

NOTES: By default at device startup, there is one VLAN configured on the Matrix E1. It is *vlan-id* 1, the default VLAN. The default community name, which determines remote access for SNMP management, is set to “public” with Read-Write access.

Table 7-4 Command Set for Creating a Secure Management VLAN

To do this...	Use these commands...
Create and name a new VLAN and confirm settings.	set vlan (Section 7.3.2.1)
	set vlan name (Section 7.3.2.2)
	(Optional) show vlan (Section 7.3.1.1)
Set the new VLAN as the host VLAN, confirm settings, and add user ports.	set port vlan host (Section 7.3.6.2)
	(Optional) show host vlan (Section 7.3.6.1)
Set a private community name and access policy and confirm settings.	set community (Section 5.2.2.8)
	(Optional) show community (Section 5.2.2.7)

NOTE: This process would be repeated on every device that is connected in the network to ensure that each device has a secure management VLAN. When configuring multiple devices, *vlan-names* can be different, but the management *vlan-id* number must be the same on each device. This is because the management *vlan-id* is included in each packet.

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7.3.8 Enabling/Disabling GVRP (GARP VLAN Registration Protocol)

Purpose

To dynamically create VLANs across a switched network. The GVRP command set is used to display GVRP configuration information, the current global GVRP state setting, individual port settings (enable or disable) and timer settings. By default, GVRP is enabled on all ports.

More About GARP VLAN Registration Protocol (GVRP)

The following sections describe the device operation when its ports are operating under the Generic Attribute Registration Protocol (GARP) application – GARP VLAN Registration Protocol (GVRP).

Overview

The purpose of GVRP is to dynamically create VLANs across a switched network. When a VLAN is declared, the information is transmitted out GVRP configured ports on the device in a GARP formatted frame using the GVRP multicast MAC address. A switch/router that receives this frame, examines the frame, and extracts the VLAN IDs. GVRP then creates the VLANs and adds the receiving port to its tagged member list for the extracted VLAN ID(s). The information is then transmitted out the other GVRP configured ports of the device. Figure 7-1 shows an example of how VLAN Blue from end station A would be propagated across a switch/router network.

How It Works

In Figure 7-1, Device 4, port 1 is registered as being a member of VLAN Blue and then declares this fact out all its ports (2 and 3) to Device 1 and Device 2. These two devices register this in the port egress lists of the ports (Device 1, port 1 and Device 2, port 1) that received the frames with the information. Device 2, which is connected to Device 3 and Device 5 declares the same information to those two devices and the port egress list of each port is updated with the new information, accordingly.

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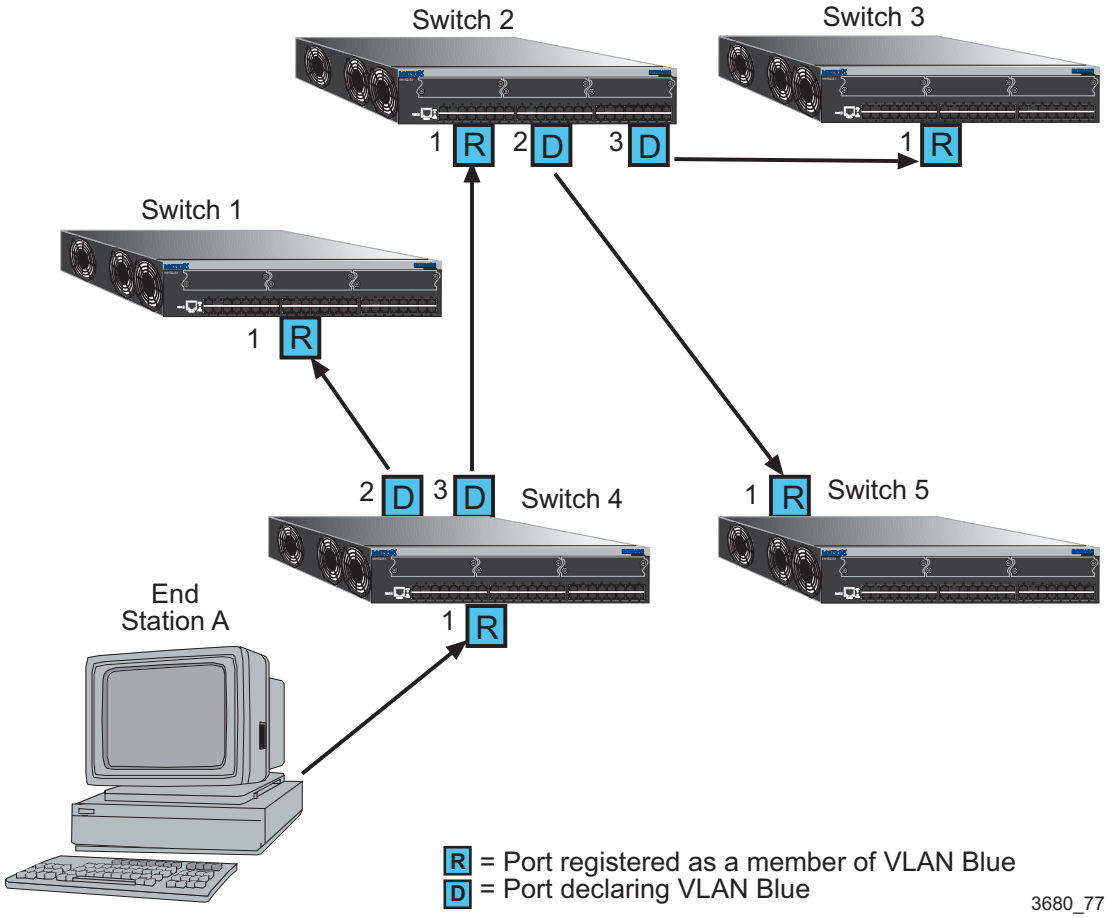
Figure 7-1 Example of VLAN Propagation via GVRP



Configuring a VLAN on an 802.1Q switch creates a static GVRP entry. The entry will always remain registered and will not time out. However, dynamic entries will time-out and their registrations will be removed from the member list if the end station A is removed. This ensures that, if switches are disconnected or if end stations are removed, the registered information remains accurate.

The end result is that the port egress list of a port is updated with information about VLANs that reside off that port, even if the actual station on the VLAN is several hops away.

Commands

The commands used to configure GVRP are listed below and described in the associated section as shown.

- show gvrp (Section 7.3.8.1)
- show garp timer (Section 7.3.8.2)

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- set gvrp (Section 7.3.8.3)
- set garp timer (Section 7.3.8.4)

7.3.8.1 show gvrp

Use this command to display GVRP status.

show gvrp [*port-string*]

Syntax Description

port-string	(Optional) Displays GVRP configuration information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, GVRP status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display GVRP status for Fast Ethernet front panel ports 1 though 10:

```
Matrix>show gvrp fe.0.1-10
 Global GVRP Configuration is enabled.

 Port       GVRP
 Number     Status
 ---------  ---------
 fe.0.1     enabled
 fe.0.2     enabled
 fe.0.3     enabled
 fe.0.4     enabled
 fe.0.5     enabled
 fe.0.6     enabled
 fe.0.7     enabled
 fe.0.8     enabled
 fe.0.9     enabled
 fe.0.10    enabled
```


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7.3.8.2 show garp timer

Use this command to display GARP timer values set for one or more ports.

show garp timer [*port-string*]

Syntax Description

port-string	(Optional) Displays GARP timer information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, GARP timer information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display GARP timer information on Fast Ethernet front panel ports 1 through 10:

NOTE: For a functional description of the terms **join**, **leave**, and **leaveall** timers, refer to the standard IEEE 802.1Q documentation, which is not supplied with this device.

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```
Matrix>show garp timer fe.0.1-10
 Port based GARP Configuration: (Timer units are centiseconds)
 Port Number     Join        Leave     Leaveall
 -----------  ----------  ----------  ----------
 fe.0.1             20          60        1000
 fe.0.2             20          60        1000
 fe.0.3             20          60        1000
 fe.0.4             20          60        1000
 fe.0.5             20          60        1000
 fe.0.6             20          60        1000
 fe.0.7             20          60        1000
 fe.0.8             20          60        1000
 fe.0.9             20          60        1000
 fe.0.10            20          60        1000
```

Table 7-5 provides an explanation of the command output. For details on using the **set gvrp** command to enable or disable GVRP, refer to Section 7.3.8.3. For details on using the **set garp timers** command to change default timer values, refer to Section 7.3.8.4.

Table 7-5 show gvrp configuration Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
Join	Join timer setting.
Leave	Leave timer setting.
Leaveall	Leavall timer setting.

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7.3.8.3 set gvrp

Use this command to enable or disable GVRP globally on the device or on one or more ports.

set gvrp {**disable** | **enable**} [*port-string*]

Syntax Description

disable | **enable**	Disables or enables GVRP on the device.
port-string	(Optional) Disables or enables GVRP on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, GVRP will be globally disabled or enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to enable GVRP globally on the device:

```
Matrix>set gvrp enable
```

This example shows how to disable GVRP:

```
Matrix>set gvrp disable
```

This example shows how to enable GVRP on Fast Ethernet front panel port 1:

```
Matrix>set gvrp enable fe.0.1
```


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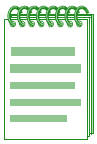
7.3.8.4 set garp timer

Use this command to adjust the values of the join, leave, and leaveall timers.

set garp timer {[**join** *timer_value*] [**leave** *timer_value*] [**leaveall** *timer_value*]} *port-string*



NOTE: The setting of these timers is critical and should only be changed by personnel familiar with the 802.1Q standards documentation, which is not supplied with this device.

Syntax Description

join *timer_value*	Sets the GARP join timer in centiseconds (Refer to 802.1Q standard.)
leave *timer_value*	Sets the GARP leave timer in centiseconds (Refer to 802.1Q standard.)
leaveall *timer_value*	Sets the GARP leaveall timer in centiseconds (Refer to 802.1Q standard.)
port-string	Specifies the port(s) on which to configure GARP timer settings. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to set the GARP join timer value to 100 centiseconds for all the ports on all the VLANs:

```
Matrix>set garp timer join 100
```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This example shows how to set the leave timer value to 300 centiseconds for all the ports on all the VLANs:

```
Matrix>set garp timer leave 300
```

This example shows how to set the leaveall timer value to 20000 centiseconds for all the ports on all the VLANs:

```
Matrix>set garp timer leaveall 20000
```


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8

Policy Classification Configuration

This chapter describes the Policy Classification set of commands and how to use them.

NOTE: It is recommended that you use Enterasys Networks NetSight Atlas Policy Manager as an alternative to CLI for configuring policy classification on Matrix E1 Series devices.

8.1 POLICY CLASSIFICATION CONFIGURATION SUMMARY

Matrix E1 Series devices support policy profile-based provisioning of network resources by allowing IT administrators to:

- Create, change or remove user roles or profiles based on business-specific use of network services.
- Permit or deny access to specific services by creating and assigning classification rules which map user profiles to frame filtering policies.
- Assign or unassign ports to policy profiles so that only ports activated for a profile will be allowed to transmit frames accordingly.

8.2 PROCESS OVERVIEW: POLICY CLASSIFICATION CONFIGURATION

Use the following steps as a guide to configure policy classification on the device:

1. Configuring policy profiles (Section 8.3.1)
2. Assigning classification rules to policy profiles (Section 8.3.2)
3. Assigning ports to policy profiles (Section 8.3.3)

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8.3 POLICY CLASSIFICATION CONFIGURATION COMMAND SET

8.3.1 Configuring Policy Profiles

Purpose

To review, create, change and remove user profiles that relate to business-driven policies for managing network resources.

Commands

The commands used to review and configure policy profiles are listed below and described in the associated section as shown.

- show policy profile (Section 8.3.1.1)
- set policy profile (Section 8.3.1.2)
- clear policy profile (Section 8.3.1.3)
- show policy invalid action (Section 8.3.1.4)
- set policy invalid action (Section 8.3.1.5)
- clear policy invalid action (Section 8.3.1.6)

8.3.1.1 show policy profile

Use this command to display policy profile information.

show policy profile [*profile-index*]

Syntax Description

profile-index	(Optional) Displays policy information for a specific profile index.

Command Defaults

If *profile-index* is not specified, all policy profile information will be displayed.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This example shows how to display policy information for profile 1, which is named “netadmin”. This profile is currently active and has PVID and COS override functions disabled:

```
Matrix>show policy profile 1
Profile Index    : 1
Profile Name     : netadmin
Row Status       : Active
Port Vid Status  : Enabled
Port Vid         : 1
COS Status       : Disabled
COS              : 0
SummaryAdminId   : fe.0.1
SummaryOperId    : fe.0.1
```

Table 8-1 provides an explanation of the command output.

Table 8-1 show policy profile Output Details

Output	What It Displays...
Profile Index	Number of the profile entry.
Profile Name	User-supplied name assigned to this profile entry.
Row Status	Whether or not the profile is enabled (**active**) or disabled.
Port Vid Status	Whether or not PVID override is **enabled** or **disabled** for this profile.
Port Vid	PVID assigned to the PVID override function.
COS Status	Whether or not Class of Service override is **enabled** or **disabled** for this profile.
COS	Class of Service value enabled or disabled for override.
SummaryAdminId	Ports administratively assigned to this policy profile.
SummaryOperId	Ports currently operating with this policy profile.

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8.3.1.2 set policy profile

Use this command to create a policy profile entry.

set policy profile *profile-index* {[**enable** | **disable**] [*name* **enable** | **disable** *vlan-id* **enable** | **disable** *cos*]}

Syntax Description

profile-index	Specifies an index number for the profile entry. Valid values are **1** to **65535**.
enable | **disable**	Enables or disables the profile entry.
name	Specifies a name for the entry.
enable | **disable** *vlan-id*	Enables or disables port VLAN ID (PVID) override for this profile with the specified *vlan-id*. Valid values and their corresponding actions are: • **4095**: classifies all traffic to an 802.1Q PVID and permits it to forward. PVID must be assigned to this policy profile with the **set policy port** command as described in Section 8.3.3.2. • **0**: denies and discards all untagged traffic. • **1**: classifies all traffic to the default VLAN. • **2 - 4094**: classifies all traffic to the specified VLAN.
enable | **disable** *cos*	Enables or disables Class of Service override for this profile with the specified class. Valid values are **0** to **7**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to enable policy profile 1 named netadmin. VLAN classification is enabled for this policy on VLAN 1 and Class of Service classification is disabled for class 0:

```
Matrix>set policy profile 1 enable netadmin enable 1 disable 0
```

8.3.1.3 clear policy profile

Use this command to delete one or all policy profile entries.

clear policy profile *profile-index* | **all**

Syntax Description

profile-index	Specifies the index number of the profile entry to be deleted. Valid values are **1** to **65535**.
all	Deletes all policy profile entries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete policy profile 8:

```
Matrix>clear policy profile 8
```

8.3.1.4 show policy invalid action

Displays information about the action the device will apply on an invalid or unknown policy, and, if applicable, the invalid policy ID that was attempted during authentication.

show policy invalid action

Syntax Description

None.

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Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to display invalid policy action information:

```
Matrix>show policy invalid action
Current action on invalid/unknown profile is: Apply default policy
Number of invalid/unknown profiles detected: 0
```

8.3.1.5 set policy invalid action
Use this command to assign the action the device will apply to an invalid or unknown policy.

set policy invalid action {**default-policy** | **drop** | **forward**}

Syntax Description

default-policy	Instructs the device to ignore this result and search for the next policy assignment rule.
drop	Instructs the device to block traffic.
forward	Instructs the device to forward traffic as if no policy has been assigned.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

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Example

This example shows how to assign a drop action to invalid policies:

```
Matrix>set policy invalid action drop
```

8.3.1.6 clear policy invalid action

Use this command to reset the action the device will apply to an invalid or unknown policy to the default action of applying the default policy.

clear policy invalid action

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the invalid policy action:

```
Matrix>clear policy invalid action
```


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8.3.2 Assigning Classification Rules to Policy Profiles

Purpose

To review, assign and unassign classification rules to user profiles. This maps users to specific policies provisioning business use of network resources.

Commands

The commands used to review, assign and unassign classification rules to user profiles are listed below and described in the associated section as shown.

- show policy class (Section 8.3.2.1)
- set policy classify (Section 8.3.2.2)
- clear policy class (Section 8.3.2.4)
- show policy maptable (Section 8.3.2.5)
- show vlanauthorization (Section 8.3.2.6)
- set vlanauthorization (Section 8.3.2.7)
- set policy maptable response (Section 8.3.2.8)
- clear policy maptable response (Section 8.3.2.9)
- set policy maptable (Section 8.3.2.10)
- clear policy maptable (Section 8.3.2.11)

8.3.2.1 show policy class

Use this command to display policy classification information.

show policy class [*profile-index*]

Syntax Description

profile-index	(Optional) Displays policy classification information for a specific profile index number. Valid values are **1** - **65535**.

Command Defaults

If *profile-index* is not specified, information will be displayed for all profiles.

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Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display policy classification information. In this case, there is a policy classification entry number 1 assigned to profile index 1. It classifies Ethernet II (0x600) Type frames to a Class of Service of 0. Currently, port fe.0.1 is active for this rule.

```
Matrix>show policy class
Policy Classification Entries
 --------------------------------
 Profile index: 1, Classification index: 1,
 Priority: 0, Ethernet II Type: 600, Status: enabled,
 Port List: None
 ----------
   Port       AdminID    OperID
  -------    -------    ------
  fe.0.1     1          0
  fe.0.2     0          0
  fe.0.3     0          0
  fe.0.4     0          0
  fe.0.5     0          0
  fe.0.6     0          0
```

8.3.2.2 set policy classify

Use this command to assign incoming untagged frames to a specific policy profile and to VLAN or Class-of-Service classification rules.

set policy classify *profile-index classify-index* {**vlan** | **cos**} *classify-value* {**ether** | **ipbil** | **ipdest** | **ipproto** | **ipsource** | **iptos** | **ipxbil** | **ipxbilsocket** | **ipxclass** | **ipxdest** | **ipxdestsocket** | **ipxsource** | **ipxsourcesocket** | **ipxtype** | **llc** | **macbil** | **macdest** | **macsource** | **tcpbilrange** | **tcpdestrange** | **tcpportdest** | **tcpportsource** | **tcpsrcrange** | **udpportbil** | **udpportdest** | **udpportsource** | **udpsrcrange**} *data_value* [*data_mask*]

NOTE: Classification rules are automatically enabled when created.

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Syntax Description

profile-index	Specifies a profile index number. Assigned to this classification rule with the **set policy profile** command (Section 8.3.1.2). Valid values are **1** to **65535**.
classify-index	Specifies a number of the classification rule. Valid values are **1** to **65535**.
vlan | **cos**	Specifies whether this rule will classify to a VLAN or Class-of-Service. **NOTE:** VLAN classification is available for Ethernet II type (**ether**) and 802.3 SAP (**llc**) frames. Untagged frames received with any of the other VLAN classification protocols listed below will be dropped and not forwarded.
classify-value	Specifies a Class-of-Service value or VLAN ID to associate with the classification rule. Valid CoS values are **0** - **7**. Valid VLAN ID values and associated actions are: • **4095**: permits these frames to forward on all VLANs. • **0**: denies and discards these frames for all VLANs. • **1**: classifies these frames the default VLAN. • **2** - **4094**: classifies these frames to the specified VLAN.
ether	Classifies based on type field in Ethernet II packet.
ipbil	Classifies based on bilateral IP address.
ipdest	Classifies based on destination IP address.
ipproto	Classifies based on Protocol field in IP packet.
ipsource	Classifies based on source IP address.
iptos	Classifies based on Type of Service field in IP packet.
ipxbil	Classifies based on bilateral IPX address.
ipxbilsocket	Classifies based on bilateral IPX socket.
ipxclass	Classifies based on transmission control in IPX.
ipxdest	Classifies based on destination IPX address.
ipxdestsocket	Classifies based on destination IPX socket.

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ipxsource	Classifies based on source IPX address.
ipxsourcesocket	Classifies based on source IPX socket.
ipxtype	Classifies based on IPX packet type.
llc	Classifies based on DSAP/SSAP pair in 802.3 type packet.
macbil	Classifies based on MAC bilateral address.
macdest	Classifies based on MAC destination address.
macsource	Classifies based on MAC source address.
tcpbilrange	Classifies based on a range of TCP bilateral ports.
tcpdestrange	Classifies based on a range of TCP destination ports.
tcpportdest	Classifies based on TCP destination port.
tcpportsource	Classifies based on TCP source port.
tcpsrcrange	Classifies based on a range of TCP source ports.
udpbilrange	Classifies based on a range of UDP bilateral ports.
udpdestrange	Classifies based on a range of UDP destination ports.
udpportbil	Classifies based on UDP bilateral port.
udpportdest	Classifies based on UDP destination port.
udpportsource	Classifies based on UDP source port.
udpsrcrange	Classifies based on a range of UDP source ports.
data_value	Specifies the code for a predefined classifier. This value is dependent on the classification type entered. Refer to Table 8-2 for valid values for each classification type.
data_mask	(Not required for most data values.) Specifies a value dependent on the *data-value* entered. Refer to Table 8-2 for valid values for each classification type and data value.

Command Defaults

Data masks are required only for classification types requiring a second *data-value*. For details, refer to Table 8-2.

Command Type

Switch command.

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Command Mode

Read-Write.

Examples

This example shows how to use Table 8-2 to create (and enable) classification rule number 1. This rule will classify Ethernet II Type 1526 frames to VLAN 7 on the ports assigned to policy 1:

```
Matrix>set policy classify 1 1 vlan 7 ether 1526
```

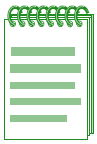
This shows how to set a classification rule that permits Ethernet II Type 1526 frames to be forwarded on all VLANs:

```
Matrix>set policy classify 2 2 vlan 4095 ether 1526
```

This example shows how to use Table 8-2 to create (and enable) classification rule number 5. This rule specifies that UDP frames from source port 45 will be filtered from VLAN 7 on ports assigned to policy profile 8:

```
Matrix>set policy classify 8 5 vlan 7 udpportsource 45
```

Table 8-2 provides the **set policy classify** *data_values* that can be entered for a particular classification type, and the *data_mask* that can be entered for each classifier associated with that parameter.



NOTE: VLAN classification is available for Ethernet II type (**ether**) and 802.3 SAP (**llc**) frames. Untagged frames received with any of the other VLAN classification protocols listed in Table 8-2 will be dropped and not forwarded.

Table 8-2 Valid Values for Policy Classification

Classification Parameter	*data_value*	*data_mask*
ether	Type field in Ethernet II packet: **0x600 - 0xffff**	Not applicable.
llc	DSAP/SSAP pair in 802.3 type packet field: **0 - 65535**	Not applicable.

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Table 8-2 Valid Values for Policy Classification (Continued)

Classification Parameter	*data_value*	*data_mask*
IP Address (Bilateral, Source or Destination): **ipbil** **ipsource** **ipdest**	IP Address in dotted decimal format: **000.000.000.000**	Data mask bits
NOTE: While the distinction of Source/Destination makes entries with the same IP Address, Network Number, Port Range, or MAC address unique, only one entry from this and similar groups in this table may exist for a given address or port designation. Additional entries will fail.		
ipproto	Protocol field in IP packet - **0 - 255**	Not applicable.
iptos	Type of Service field in IP packet: **0 - 255**	Not applicable
ipxclass	Transmission control (Class of Service) field in IPX: **0 - 255**	Not applicable.
ipxtype	IPX packet type field **(0 - 255)**	Not applicable.
IPX Network Address (Bilateral, Source or Destination): **ipxbil** **ipxsource** **ipxdest**	IPX Address: **0 - 0xffffffff**	Not applicable.
IPX Socket (Bilateral, Source or Destination): **ipxbilsocket** **ipxsourcesocket** **ipxdestsocket**	IPX Socket Number: **0 - 65535**	Not applicable.

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Table 8-2 Valid Values for Policy Classification (Continued)

Classification Parameter	*data_value*	*data_mask*
MAC Address (Bilateral, Source or Destination): **macbil** **macsource** **macdest**	MAC Address: **00-00-00-00-00-00**	Data mask bits
TCP Port (Bilateral, Source or Destination): **tcpportbil** **tcpportsource** **tcpportdest**	TCP Port Number: **0 - 65535**	Not applicable.
TCP Range (Bilateral, Source or Destination): **tcpbilrange** **tcpsrcrcrange** **tcpdestrange**	Lower boundary of port range: **0 - 65535**	Upper boundary of port range: **0 - 65535**
UDP Port (Bilateral, Source or Destination): **udpportbil** **udpportsource** **udpportdest**	UDP Port Number: **0 - 65535**	Not applicable.
UDP Range (Bilateral, Source or Destination): **udpbilrange** **udpdsrcrange** **udpdestrange**	Lower boundary of port range: **0 - 65535**	Upper boundary of port range: **0 - 65535**

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8.3.2.3 Classification Precedence Rules

NOTE: It is important that you have a comprehensive understanding of the precedence concept before configuring the switch, as these rules can have a significant impact on the network operation.

When there are multiple classification rules assigned to a switch, the device must determine which classification rule takes precedence according to classification precedence rules. The order of precedence is predefined in the switch and cannot be changed.

Table 8-3 lists classifications and associated precedence levels.

NOTE: In Table 8-3, the following applies:

- Exact Match indicates a match of an explicitly defined address.
- Best Match indicates a match of an entire subnet, or range of addresses within a subnet.

Table 8-3 Classification Precedence

Classification Type(s)	Precedence Level
Source MAC Address Best Match	1
Destination MAC Address Best Match	2
Source IP Address Exact Match / Source IPX Network Number	3
Source IP Address Best Match / Destination IPX Network Number	4
Destination IP Address Exact Match	5
Destination IP Address Best Match	6
IP Fragment	7
IPX Socket Source / UDP or TCP Source Port	8
IPX Socket Destination / UDP or TCP Destination Port	9
ICMP	10
IP TOS / IPX COS	11
IP Protocol Type / IPX Packet Type	12

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Table 8-3 Classification Precedence (Continued)

Ethertype Field / DSAP/SSAP Fields	13
VLAN	14
Priority	15

8.3.2.4 clear policy class

Use this command to delete one or all policy classification entries.

clear policy class *profile-index* | **all**

Syntax Description

profile-index	Specifies the profile index number of the policy classification to be deleted. Valid values are **1** to **65535**.
all	Deletes all policy classification entries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to delete all policy classification entries:

```
Matrix>clear policy class all
```


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8.3.2.5 show policy maptable

Use this command to display policy-to-VLAN mapping information. When VLAN authorization is enabled both globally and for the authenticated port, the policy map table can be used to assign a policy using the VLAN provided in the VLAN tunnel attributes.

show policy maptable

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display policy to VLAN mapping information. In this case, RADIUS authentication is configured to authenticate according to policy profile ID. Policy profile 2 is assigned to authenticate for VLANs 3 and 4, and policy profile 1 is assigned to authenticate for VLAN 6:.

```
Matrix>show policy maptable
Policy map response:   policyProfile

Policy Mappings
---------------
Policy map last changed at sysUpTime:   0  days 00:07:34
VLAN Id   Policy Profile Index
-------   --------------------
3         2
4         2
6         1
```


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8.3.2.6 show vlanauthorization

Use this command to displays the status of VLAN tunnel attribute processing during policy authentication.

show vlanauthorization

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of VLAN authorization. In this case, it is globally enabled, and enabled on all ports. No VLAN IDs have been configured for policy authentication:.

```
Matrix>show vlanauthorization
VLAN Authorization is globally enabled
 Port     Status     VLAN Id
 -------  --------   ---------
 fe.0.1   enabled    0
 fe.0.2   enabled    0
 fe.0.3   enabled    0
 fe.0.4   enabled    0
 fe.0.5   enabled    0
 fe.0.6   enabled    0
 fe.0.7   enabled    0
 fe.0.8   enabled    0
 fe.0.9   enabled    0
 fe.0.10  enabled    0
 fe.0.11  enabled    0
 fe.0.12  enabled    0
 fe.0.13  enabled    0
 fe.0.14  enabled    0
 fe.0.15  enabled    0
 fe.0.16  enabled    0
--More--
```


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8.3.2.7 set vlanauthorization

Use this command to enable or disable VLAN tunnel attribute processing during policy authentication. Disabling this attribute will prevent authenticated VLAN tunnel attributes from being applied, but will not prevent the port from being authenticated.

NOTE: The following RADIUS tunnel attributes must be present for proper VLAN authentication:

- Tunnel-medium-type = 802
- Tunnel-Type = Virtual LANs (VLANs)
- Tunnel-pvt-group-id = VLAN number to authenticate.

set vlanauthorization {**enable** | **disable** [*port-string*]}

Syntax Description

enable | **disable**	Enables or disables VLAN tunnel attribute processing.
port-string	(Optional) Specifies the port(s) on which VLAN tunnel attribute processing will be enabled or disabled. VLAN authorization must be globally enabled, and enabled on all authentication ports, for policy authentication using a VLAN tunnel attribute to take effect.

Command Defaults

If *port-string* is not specified, VLAN authorization will be globally enabled, but will not be enabled on any ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable VLAN authorization globally, and on ports fe.0.1 through 4:

```
Matrix>set vlanauthorization enable
Matrix>set vlanauthorization enable fe.0.1-4
```


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8.3.2.8 set policy maptable response

Use this command to select which RADIUS attributes to use if both tunnel attributes and a profile filter ID are present. If only one attribute is present, it will be used regardless of this setting. If **vlantunnel** is selected, the VLAN tunnel attributes will take priority over the profile filter ID, even if the **vlanauthorization** table is disabled (as described in Section 8.3.2.7). If a port is authenticated to a VLAN, the port VLAN is overridden and, if present, any default policy on the port will be removed.

set policy maptable response {**policyprofile** | **vlantunnel**}

Syntax Description

policyprofile | **vlantunnel**	Configures policy authentication to use the profile filter ID or VLAN tunnel attributes.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to configure policy authentication to use VLAN tunnel attributes:

```
Matrix>set policy maptable response vlantunnel
```

8.3.2.9 clear policy maptable response

Use this command to clear the policy map table response configuration.

clear policy maptable response

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the policy map table response configuration:

```
Matrix>clear policy maptable response
```

8.3.2.10 set policy maptable

Use this command to map returned VLAN tunnel attributes to a policy profile index. When VLAN authorization is enabled (globally and on ports being authenticated, as described in Section 8.3.2.7), the policy map table can be used to authenticate a mapped policy profile index to a VLAN tunnel attribute. If the policy maptable is zero for any VLAN entry, the maptable will not be used, and the authentication will simply be to override the port VLAN for the duration of the authenticated session.

set policy maptable *vlan-list profile-index*

Syntax Description

vlan-list	Specifies the VLAN(s) for which policy authentication via a VLAN-to-policy mapping will be allowed.
profile-index	Specifies the profile index number of the policy classification to be authenticated. Valid values are **1** to **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to configure policy profile 6 to authenticate for VLAN 10:

```
Matrix>set policy maptable 10 6
```

8.3.2.11 clear policy maptable

Use this command to clear policy profile mapping to one or more VLANs.

clear policy maptable [*vlan-list*]

Syntax Description

vlan-list	(Optional) Specifies the VLAN(s) for which policy to VLAN mapping will be cleared.

Command Defaults

If *vlan-list* is not specified, policy to VLAN mapping will be cleared for all VLANs.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the policy profile mapping for VLAN 10:

```
Matrix>clear policy maptable 6
```


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8.3.3 Assigning Ports to Policy Profiles

Purpose

To assign and unassign ports to policy profiles, and to display policy information about one or more ports.

Commands

The commands used to assign ports to policy profiles are listed below and described in the associated section as shown.

- show policy port (Section 8.3.3.1)
- set policy port (Section 8.3.3.2)
- clear policy port (Section 8.3.3.3)

8.3.3.1 show policy port

Use this command to display policy information for one or more ports.

show policy port [*port-string*]

Syntax Description

port-string	(Optional) Displays policy classification information for a specific port. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, policy information will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display policy information for Fast Ethernet front panel port 21. In this case, the port is allowed to transmit untagged frames to policy profile 1 based on the classification rules assigned to that policy*:*

```
Matrix>show policy port fe.0.21
Port       AdminId  OperId
-------------------------
fe.0.21    1           1
```

8.3.3.2 set policy port

Use this command to assign ports to a policy profile. Ports assigned will now be active for this profile. Untagged frames received will be tagged according to the policy profile settings.

set policy port *port-string admin-id*

Syntax Description

port-string	Specifies the port(s) to add to the policy profile. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
admin-id	Specifies the ID of the policy profile (role) to which the port(s) will be added.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to allow Fast Ethernet front panel ports 5 through 15 to classify frames according to policy profile 5:

```
Matrix>set port policy fe.0.5-15 5
```


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8.3.3.3 clear policy port

Use this command to delete one or all policy port entries.

clear policy port *port-string* | **all**

Syntax Description

port-string	Specifies the port(s) to remove from a policy profile. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
all	Deletes all policy port entries.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove Fast Ethernet front panel port 21 from a policy profile:

```
Matrix>clear policy port fe.0.21
```


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9

Port Priority and Classification Configuration

This chapter describes the Port Priority, Priority Classification, and Rate Limiting set of commands and how to use them.

9.1 PORT PRIORITY AND CLASSIFICATION CONFIGURATION SUMMARY

9.1.1 Priority

Important Notice

In addition to the commands described in this section, Matrix E1 (1G58x-09 and 1H582-xx) devices with firmware versions 2.05.xx and higher also support policy profile-based classification to a Class of Service or VLAN. Policy classification commands that can be used alternatively to priority classification commands are noted in the appropriate sections under the heading "Command Alternative (v2.05.xx and higher)". For a description of the complete policy classification command set, refer to Chapter 8.

This device supports Class of Service (CoS), which allows you to assign mission-critical data to higher priority through the device by delaying less critical traffic during periods of congestion. The higher priority traffic through the device is serviced first before lower priority traffic. The Class of Service capability of the device is implemented by a priority queueing mechanism. Class of Service is based on the IEEE 802.1D (802.1p) standard specification, and allows you to define eight priorities (0 through 7) and four transmit queues (0-3) of traffic for each port.

A priority 0 through 7 can be set on each port, with 0 being the lowest priority. A port receiving a frame without priority information in its tag header is assigned a priority according to the default priority setting on the port. For example, if the priority of a port is set to 5, the frames received through that port without a priority indicated in their tag header are classified as a priority 5 and transmitted according to that priority.

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9.1.2 Priority Queueing Modes (Algorithms)

The transmit queues for each port on the device can be configured with different queueing algorithms, as described in the following subsections.

Strict Priority Queueing (SP)

SP queueing provides higher priority queues with absolute preferential treatment over low priority queues, which minimizes the queueing delay of frames from the higher queues. The transmit port does not serve a transmit queue unless all higher priority queues are empty.

Weighted Round Robin (WRR)

The frames are emptied out of the four queues with a weighted priority expressed in a percentage of total traffic for each queue. The weighted queues are served in round-robin order with a configured weight for each queue. The four queue settings must add up to 100 percent. This guarantees minimum bandwidth for each queue in all cases, and can ensure that no queue reaches more than a predetermined proportion of the overall capacity (Guarantee Maximum Bandwidth) under stress.

Hybrid Queueing

There are two modes of hybrid queueing:

Mode 1

In mode 1, the highest queue (Q3) has a strict priority over all other three queues, so that the frames in the lower three transmit queues are not served until there are no frames in the highest queue. When there are no frames in the highest queue, the other three queues are served using the WRR algorithm according to weighted queues 0, 1, and 2.

Mode 2

In mode 2, the highest two queues (Q3 and Q2) have a strict priority over the other two queues, so that the lower two transmit queues are not served until the highest two queues (first Q3, then Q2) are empty. When there are no more frames in the highest two queues, the frames in Q1 and Q0 are served using the WRR algorithm according to the weighted queues 1 and 0.

A typical implementation of hybrid queueing is to redirect “Expected Service” traffic to the highest priority queue, which will have strict priority over all other queues. Therefore, when combined with the appropriate admission control, it can have a guaranteed delay for the frames it holds while the other 3 queues run in WRR for “assured bandwidth” traffic.

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9.1.3 Port Classification

Port classification is another way to manage network traffic through the device. Port classification allows you to configure one or more device ports to prioritize and forward untagged frames according to a specific protocol type classification rule. By default, when a frame is received that already contains an 802.1Q frame tag, frame classification is not implemented. Instead, the frame is processed by the Matrix E1 device according to the information contained in the 802.1Q frame tag.

NOTE: When the priority tag override feature is enabled on a port, 802.1Q frame tags received on that port are assigned a lower precedence, allowing MAC address matching and other types of priority classifications to receive higher precedence. For details on enabling this feature, refer to Section 9.3.4.8. For details on how this feature changes default classification precedence rules, refer to Table 9-2.

When configuring the ports, you can

- display the current classification, and entries of each classification rule,
- assign priorities to classification rules,
- assign an 8-bit Type of Service (ToS) value to incoming IP frames,
- add/delete a priority and associated protocol entry,
- overwrite default precedence levels assigned in an 802.1Q tagged frame, and
- overwrite an existing ToS value.

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9.2 PROCESS OVERVIEW: PRIORITY, CLASSIFICATION, AND RATE LIMITING CONFIGURATION

Use the following steps as a guide to the port priority, QoS, classification, and rate limiting configuration process:

1. Configuring Port Priority (Section 9.3.1)
2. Configuring Priority Queueing (Section 9.3.2)
3. Configuring Quality of Service (QoS) (Section 9.3.3)
4. Configuring Priority Classification (Section 9.3.4)
5. Configuring Port Traffic Rate Limiting (Section 9.3.6)

9.3 PORT PRIORITY AND CLASSIFICATION CONFIGURATION COMMANDS

9.3.1 Configuring Port Priority

Purpose

To view or configure port priority characteristics as follows:

- Display or change the port default transmit priority (0 through 7) of each port for frames that are received (ingress) without priority information in their tag header.
- Display the current traffic class mapping-to-priority of each port.
- Set each port to transmit frames according to 802.1p priority transmit queues set in the frame header.

Commands

The commands to configure port priority are listed below and described in the associated section.

- show port priority (Section 9.3.2.1)
- set port priority (Section 9.3.1.2)
- clear port priority (Section 9.3.1.3)

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9.3.1.1 show port priority

Use this command to display the 802.1p priority for one or more ports.

show port priority [*port-string*]

Syntax Description

port-string	(Optional) Displays priority information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, port priority for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the port priority for the Fast Ethernet expansion module 3, port 11. In this case, the priority is 5:

```
Matrix>show port priority fe.3.11
 Port fe.3.11 has port priority of 5.
```

9.3.1.2 set port priority

Use this command to set the 802.1D transmit queue priority (0 through 7) on each port. A port receiving a frame without priority information in its tag header is assigned a priority according to the priority setting on the port. For example, if the priority of a port is set to 5, the frames received through that port without a priority indicated in their tag header are classified as a priority 5.

A frame with priority information in its tag header is transmitted according to that priority.

set port priority *port-string priority*

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Syntax Description

port-string	Specifies the port for which to set priority. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
priority	Specifies an 802.1D port priority. Valid values are **0** - **7**, with 0 as the lowest priority.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a default priority of 6 on Fast Ethernet front panel port 3. Frames received by port 3 without priority information in their frame header are set to the default setting of 6:

```
Matrix>set port priority fe.0.3 6
```

9.3.1.3 clear port priority

Use this command to reset the current 802.1D port priority setting to 0. This will cause all frames received without a priority value in its header to be set to priority 0.

clear port priority *port-string*

Syntax Description

port-string	Specifies the port for which to clear priority. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

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Command Type

Switch Command.

Command Mode

Read-Write.

Example

This example shows how to reset Fast Ethernet front panel port 11 to the default priority:

```
Matrix>clear port priority fe.0.11
```

9.3.2 Configuring Priority to Transmit Queue Mapping

Purpose

To do the following:

- View the current priority to transmit queue mapping of each port, which includes both physical and virtual ports.
- Configure each port to either transmit frames according to the port priority transmit queues (set using the **set port priority** command described back in Section 9.3.1.2), or according to a priority based on a percentage of port transmission capacity (set using the **set priority queue** command described in Section 9.3.2.2).

Commands

The commands used in configuring transmit priority queues are listed below and described in the associated section.

- show priority queue (Section 9.3.2.1)
- set priority queue (Section 9.3.2.2)

9.3.2.1 show priority queue

Use this command to display the port priority levels (0 through 7, with 0 as the lowest level) associated with the current transmit priority queue (0 -3, with 0 being the lowest priority) for each priority of the selected port. A frame with a certain port priority is transmitted according to the settings entered using the set **priority queue** command described in Section 9.3.2.2.

show priority queue [*priority*]

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Syntax Description

priority	(Optional) Displays mapping of transmit queues for a specific priority (**0 - 7**).

Command Defaults

If *priority* is not specified, all priority queue information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows the type of information provided when you use the **show priority queue** command. In this case, the frames shown with a priority of 0 or 3 are transmitted according to the transmit priority queue of 1 (the second lowest transmit priority); frames with 1 or 2 priority, at the lowest transmit priority of 0; frames with 4 or 5 priority, at the second highest transmit priority of 2; and frames with 6 or 7 priority, at the highest transmit priority of 3:

```
Matrix>show priority queue
   Priority     TxQueue
 ----------   ---------
       0           1
       1           0
       2           0
       3           1
       4           2
       5           2
       6           3
       7           3
```

This example shows how to display the transmit queue associated with priority 5.

```
Matrix>show priority queue 5
   Priority     TxQueue
 ----------   ---------
       5           2
```


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9.3.2.2 set priority queue

Use this command to map 802.1p priorities to transmit queues. This enables you to change the priority queue (0 -3, with 0 being the lowest priority queue) for each port priority of the selected port. You can apply the new settings to one or more ports.

For example, if the priority queue is set to 3 for those frames with a port priority 7, then those frames would be transmitted before any frames contained in traffic classes 2 through 0.

Refer to the following table for the transmit priority queue default values according to port priority.

Frame Port Priority	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Transmit Port Priority Queue (Traffic Class)	1	0	0	1	2	2	3	3

set priority queue *priority queue*

Syntax Description

priority	Specifies a value of **0** - **7** (0 is the lowest level) that determines what priority frames will be transmitted at the priority queue level (**0** - **3**) entered in this command.
queue	Specifies a value of **0** - **3** (0 is the lowest level) that determines when to transmit the frames with the port priority entered in this command.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to use the **set priority queue** command to program the device so the priority 5 frames received are transmitted at the lowest transmit priority queue of 0:

```
Matrix>set priority queue 5 0
```


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9.3.3 Configuring Quality of Service (QoS)

Purpose

To configure one or more ports with the following Layer 2 switching features:

- Four priority queues on each port.
- Programmable scheduling per transmit (Tx) port according to fixed priority, weighted round-robin (in percentage of traffic per queue), or hybrid algorithm.

Command Descriptions

The commands to configure the Quality of Service are listed below and described in the associated section.

- show port qos (Section 9.3.3.1)
- set port qos sp (Section 9.3.3.2)
- set port qos wrr (Section 9.3.3.3)
- set port qos hybrid (Section 9.3.3.4)

9.3.3.1 show port qos

Use this command to display Quality of Service information, including the current QoS algorithm and associated queue settings, for one or more ports.

show port qos [*port-string*]

Syntax Description

port-string	(Optional) Display QoS settings for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If the *port-string* is not specified, the QoS settings for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the current algorithm, and queue 1 through 4 weights configured on Fast Ethernet front panel ports 10 through 13:

```
Matrix>show port qos fe.0.10-13

            Queue      Queue 0   Queue 1   Queue 2   Queue 3
  Port      Algorithm  Weight    Weight    Weight    Weight
  --------  ---------  --------  --------  --------  --------
  fe.0.10   WRR        25%       25%       25%       25%
  fe.0.11   Hybrid     25%       30%       45%        SP
  fe.0.12   Hybrid     40%       60%        SP        SP
  fe.0.13   Strict      SP        SP        SP        SP
```

9.3.3.2 set port qos sp

Use this command to enable 802.1p strict priority traffic queueing on one or more ports.

set port qos sp [*port-string*]

Syntax Description

port-string	(Optional) Specifies the port(s) to enable as strict 802.1 queueing ports. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, all ports will be enabled for strict 802.1 queuing.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set strict queues on the front panel Fast Ethernet port 13. With this configuration, all frames in the next higher queue must always be processed first:

```
Matrix>set port qos sp fe.0.13
```


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9.3.3.3 set port qos wrr

Use this command to set the weighted round robin transmission queues for one or more ports.

set port qos wrr *port-string que0_weight que1_weight que2_weight que3_weight*

Syntax Description

port-string	Specifies the port(s) on which to set QoS weighted queues. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
que0_weight	Specifies a percentage of weight (**0** through **100**, with **25** as the default) for queue 0.
que1_weight	Specifies a percentage of weight (**0** through **100**, with **25** as the default) for queue 1.
que2_weight	Specifies a percentage of weight (**0** through **100**, with **25** as the default) for queue 2.
que3_weight	Specifies a percentage of weight (**0** through **100**, with **25** as the default) for queue 3.

NOTE: The total percentage of transmit queue settings *que0_weight* through *que3_weight* must add up to 100%, otherwise the command is illegal.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set weighted queues on the Fast Ethernet ports 10 through 13 on the expansion module in slot 1. In this example the hybrid queues 0, 1, 2, and 3 are being set to 10, 20, 30, and 40 percent, respectively:

```
Matrix>set port qos wrr fe.1.10-13 10 20 30 40
```


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9.3.3.4 set port qos hybrid

Use this command to enable and configure one of two hybrid queuing modes, either applying 802.1p strict priority (SP) queuing to higher priority queues, or weighted round robin (WRR) queuing to lower priority queues.

set port qos hybrid *hybrid_setting port-string que1_weight que2_weight que3_weight*

Syntax Description

hybrid_setting	Specifies an integer (**1** or **2**) to select the hybrid mode of operation.
port-string	Specifies port(s) on which to set QoS weighted queues. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
que1_weight	Specifies a percentage of traffic (**0** through **100**) for queue 0. For Mode 2 do not set a weight, because this queue is controlled by the SP algorithm and not the WRR algorithm.
que2_weight	Specifies a percentage of traffic (**0** through **100**) for queue 1.
que3_weight	Specifies a percentage of traffic (**0** through **100**) for queue 2.

NOTE: The total percentage of transmit queue settings **que1_weight** through **que3_weight** must add up to 100% for Mode 1.

Settings for **que2_weight** and **que3_weight** must add up to 100% for Mode 2 operation.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example, Mode 1

This example shows how to set hybrid Mode 1 and the transmission queues on Fast Ethernet front panel ports 1 through 3. In this example the hybrid queues 0, 1, and 2 are being set to 30, 40, and 30 percent, respectively. Queue 3 will automatically use the 802.1p strict priority algorithm to service the frames in Queue 3 first. Whenever there are no frames in Queue 3, frames in Queues 0, 1, and 2 will be serviced using the WRR algorithm:

```
Matrix>set port qos hybrid 1 fe.0.1-3 30 40 30
```

Example, Mode 2

This example shows how to set hybrid Mode 2 and the transmission queues on the front panel Fast Ethernet ports 1 through 3. In this example the hybrid queues 0 and 1 are being set to 20 and 80 percent, respectively. Queues 2 and 3 will automatically use the 802.1p strict priority algorithm to service the frames in Queue 3 first, then Queue 2. Whenever there are no frames in Queues 3 and 2, frames in Queues 1 and 0 will be serviced using the WRR algorithm:

```
Matrix>set port qos hybrid 2 fe.0.1-3 20 80
```


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9.3.4 Configuring Priority Classification

Purpose

To perform the following functions:

- Display the current priority, classification, and description entries of each classification rule.
- Assign priorities according to classification rules.
- Add/delete a priority and associated protocol entry.
- Enable or disable the priority tag override feature.
- Assign an 8-bit Type of Service (TOS) value to incoming IP frames.
- Overwrite an existing TOS value.

Commands

The commands used in configuring priority classification are listed below and described in the associated section.

- show priority classification (Section 9.3.4.1)
- set priority classification (Section 9.3.4.2)
- clear priority classification (Section 9.3.4.4)
- set priority classification ingress (Section 9.3.5.1)
- clear priority classification ingress (Section 9.3.5.2)
- set priority classification tosvalue (Section 9.3.4.5)
- clear priority classification tosvalue (Section 9.3.4.6)
- show priority classification qtagoverride (Section 9.3.4.7)
- set priority classification qtagoverride (Section 9.3.4.8)

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9.3.4.1 show priority classification

Use this command to display priority classification information.

show priority classification

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Command Alternative (v2.05.xx and higher)

show policy class (**Section 8.3.2.1**)

Example

This example shows that priority classification is currently enabled on the device and that two priority classification entries have been created with a priority of 5. Currently, there are no ports on the priority classification ingress list associated with these classification rules. The ingress list is created using the **set priority classification ingress** command described in Section 9.3.5.1.

```
Matrix>show priority classification
Priority Classification enabled.
Priority Classification Entries
-------------------------------
Priority: 5, Ethernet II Type: IP, Status: enabled,
Tos Value: 0,  Tos Status: disabled,
Port List: None
----------
Priority: 5, Src UDP Range: 44-46, Status: enabled,
Tos Value: 0,  Tos Status: disabled,
Port List: None
```


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9.3.4.2 set priority classification

Use this command to create a classification rule that will assign traffic to a priority based on Layer 2/3/4/ rules.

set priority classification *priority_value data_meaning data_value* [*data_mask*] {**create** | **disable** | **enable**}

Syntax Description

priority_value	Specifies a port priority number (**0** through **7**) to which the frame classification is applied.
data_meaning	Specifies the parameters used to classify frames. Refer to Table 9-1 for the list of *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of values is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Not required for most data values). Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.
create | **disable** | **enable**	Creates, disables or enables a priority classification according to the parameters entered. **NOTE:** Classification rules are automatically enabled when created.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and higher)

set policy classify (**Section 8.3.2.2**)

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Examples

This example shows how to enable or disable the priority classifier globally. The priority classifier is disabled by default:

```
Matrix>set priority classification enable
Matrix>set priority classification disable
```

This example shows how to:

- classify Ethernet Type II IP frames to priority 7, and
- classify frames received from Source UDP ports 45 to 53 to priority 4:

```
Matrix>set priority classification 7 ethernet-II-type IP create
Matrix>set priority classification 4 src-udp-range 45 53 create
```

This example shows how to disable priority classification 7 (Ethernet Type II IP frames):

```
Matrix>set priority classification 7 ethernet-II-type IP disable
```

9.3.4.3 Valid Values for Priority Classification

Table 9-1 provides the **set priority classification** *data_meaning* parameters that can be entered to classify frames, and the *data_values* that can be entered for each classifier associated with those parameters. Values applied are listed next to each *data_value* keyword. When applicable, *data_masks* are also listed for each *data_value*.

NOTES: Classification *data_meanings* and *data_values* are NOT case sensitive.

Hyphens in parameters must be entered as shown.

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Table 9-1 Valid Values for Priority Classification

***data_meaning* keywords**	***data_value* keywords**	***data_ mask***
Ethernet-II-Type	• **05F6 - FFFF (**valid range) • **AppleTalk (**809B) • **Banyan-Vines (**0BAD) • **DECNET (**6003) • **IP (**0800) • **IPX (**8137) • **RARP (**8035)	Not applicable.
802.3-SAP	• **IPX-LLC** (E0E0) • **IPX-RAW** (FFFF) • **IPX-SNAP** (AAAA) • **Netbios** (F0F0) • **SNA** (0000, 0404, 0808 and 0C0C)	Not applicable.
IP-TOS (Type of Service)	Integer (**0 - 255**)	Not applicable
IP-Protocol-Type	• Integer (**0 - 255**) • **ICMP** • **IGMP** • **OSPF** • **TCP** • **UDP**	Not applicable.
IPX-COS (Class of Service)	Integer (**0 - 255**)	Not applicable.
IPX-Packet-Type	• **0** = **Hello-or-SAP** • **1** = **RIP** • **2** = **Echo-Packet** • **3** = **Error-Packet** • **4** = **Netware-386-or-SAP** • **5** = **Sequenced-Packet-Protocol** • **16 - 31** = Experimental Protocols • **17 = Netware-286**	Not applicable.

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Table 9-1 Valid Values for Priority Classification (Continued)

***data_meaning* keywords**	***data_value* keywords**	***data_ mask***
IP Address Group: **Src-IP-Address** **Dest-IP-Address** **Bil-IP-Address**	IP Address in dotted decimal format: **000.000.000.000**	Data mask in dotted decimal format: **000.000.000.000**
NOTE: While the distinction of Source/Destination/Bilateral makes entries with the same IP Address, Network Number, Port Range, or MAC address unique, only one entry from this and similar groups in this table may exist for a given address or port designation. Additional entries will fail.		
IPX Network Group: **Src-IPX-Network** **Dest-IPX-Network** **Bil-IPX-Network**	IPX Network Num: 0x**00000000**	Not applicable.
UDP Port Group: **Src-UDP-Port** **Dest-UDP-Port** **Bil-UDP-Port**	• Integer (**0 - 65535**) • **BootP-Client** • **BootP-Server** • **DNS** • **FTP** • **FTP-Data** • **HTTP** • **IMAP2** • **IMAP3** • **Netbios-Datagram** • **Netbios-Name-Server** • **Netbios-Sess-Server** • **POP3** • **RIP** • **Smart-Voice-Gateway** • **SMTP** • **Telnet** • **TFTP**	Not applicable.

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Table 9-1 Valid Values for Priority Classification (Continued)

***data_meaning* keywords**	***data_value* keywords**	***data_ mask***
TCP Port Group: **Src-TCP-Port** **Dest-TCP-Port** **Bil-TCP-Port**	Same selection as for UDP Port Group	Not applicable.
IPX Socket Group: **Src-IPX-Socket** **Dest-IPX-Socket** **Bil-IPX-Socket**	• Integer (**0 - 65535**) • **Diagnostics** • **IPX-WAN** • **NCP** • **Netbios** • **NLSP** • **RIP** • **SAP**	Not applicable.
MAC Address Group: **Src-MAC-Address** **Dest-MAC-Address** **Bil-MAC-Address**	MAC Address: **00-00-00-00-00-00**	Data mask bits
UDP Range Group: **Src-UDP-Range** **Dest-UDP-Range** **Bil-UDP-Range**	Lower boundary of port range: **(0 - 65535)**	Upper boundary of port range: **(0 - 65535)**
TCP Range Group: **Src-TCP-Range** **Dest-TCP-Range** **Bil-TCP-Range**	Lower boundary of port range: **0 - 65535**	Upper boundary of port range: **0 - 65535**

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9.3.4.4 clear priority classification

Use this command to clear priority classification entries.

clear priority classification *priority_value data_meaning data_value* [*data_mask*]

Syntax Description

priority_value	Specifies a port priority (**0** through **7**) associated with the classification to be cleared.
data_meaning	Specifies the *data_meaning* of the classification to be cleared. Refer to Table 9-1 for the list of *data_meaning* numbers and associated protocol types and classifications.
data _value	Specifies the *data_value* of the classification to be cleared. The range of values is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Optional for most data values) Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v2.05.xx and higher)

clear policy class (**Section 8.3.2.4**)

Example

This example shows how to remove the Ethernet II Type IP classification rule from port priority 7:

```
Matrix>clear priority classification 7 ethernet-II-type IP
```


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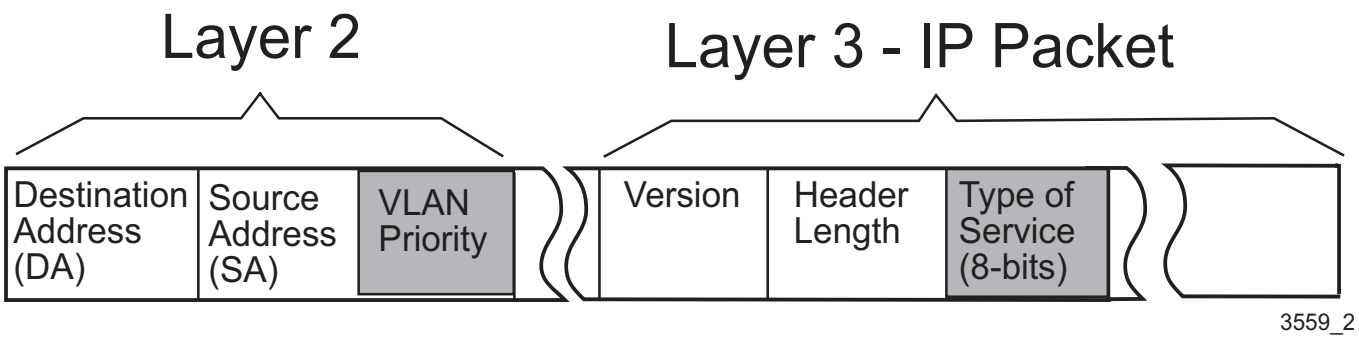
About ToS

The Type of Service (ToS) field [also known as the Differential Services (DF) field in RFC 2474] is an 8-bit field. It is located in the IP header and used by a device to indicate the precedence or priority of a given frame (see Table 9-1). Together with the 802.1p priotity and IP, ToS fields enable the ability to signal the frame priority from end to end as the frame makes its way through the network. The **set priority classification tosvalue** command enables you to set the value for the precedence or priority of a frame at both Layer 2 and Layer 3.

Figure 9-1 Datagram, Layer 2 and Layer 3



This IP ToS rewrite feature enables a Network Administrator to assign both Layer 2 Class of Service (CoS0 and Layer 3 ToS characteristics to incoming frames by rewriting the 8-bit ToS value in the IP header of incoming frames.

The Matrix E1 products enable you to configure the device to:

- Insert a user-defined 8-bit value into the IP ToS field.
- Overwrite an existing ToS value. This is useful when the Network Administrator wants to enforce a specific priority policy in the network.

9.3.4.5 set priority classification tosvalue

Use this command to enter the ToS value. This value identifies to the various switch devices and routers in the IP-based network those packets which should have preferential treatment on a Class of Service (CoS) basis.

set priority classification tosvalue *tos_value priority_value data_meaning data_value* [*data_mask*]

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Syntax Description

tos_value	Specifies an integer (**0** - **255**) to identify priority to the various switch devices and routers in the IP-based network.
priority_value	Specifies a port priority (**0** through **7**) associated with the classification to be set.
data_meaning	Specifies the *data_meaning* for the parameter used to classify frames. Refer to Table 9-1 for the list of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of values is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Not required for most data values) Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set a ToS value of 200 to frames with a priority 7, meeting the Ethernet Type II IP classification rule:

```
Matrix>set priority classification tosvalue 200 7 ethernet-II-type IP
```


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9.3.4.6 set priority classification tosstatus

Use this command to enable or disable the ToS value configured in the **set priority classification tosstatus** command.

s**et priority classification tosstatus** *priority_value data_meaning data_value* [*data_mask*] {**enable** | **disable**}

Syntax Description

priority_value	Specifies a port priority (0 through 7) associated with the classification to be enabled or disabled.
data_meaning	Specifies the *data_meaning* for the parameter used to classify frames. Refer to Table 9-1 for the list of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of values is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Optional for most data values) Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.
{**enable** | **disable**}	Enables or disables the ToS parameters entered.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the TOS value configured for the Ethernet Type II IP classification rule:

```
Matrix>set priority classification tosstatus 7 ethernet-II-type IP enable
```


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9.3.4.7 show priority classification qtagoverride

Use this command to display the status of the priority tag override feature on one or more ports. When enabled as described in Section 9.3.4.8, this feature lowers the precedence level of 802.1Q frame tags received on specified ports.

show priority classification qtagoverride [*port-string*]

Syntax Description

port-string	(Optional) Displays status of the 802.1p priority tag override feature on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, priority tag override status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display priority tag override status for Fast Ethernet front panel ports 1 through 3:

```
Matrix>show priority classification qtagoverride fe.0.1-3
 Qtag override status is disabled for port fe.0.1.
 Qtag override status is disabled for port fe.0.2.
 Qtag override status is disabled for port fe.0.3.
```

9.3.4.8 set priority classification qtagoverride

Use this command to enable or disable the priority tag override feature on one or more ports. When enabled, this feature lowers the precedence level of 802.1Q (VLAN) frame tags received on specified ports, allowing MAC address matching and other types of priority classifications to receive higher precedence. Classification precedence rules with this feature disabled and enabled are listed in Table 9-2.

set priority classification qtagoverride *port-string* **enable** | **disable**

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Syntax Description

port-string	Specifies the port(s) for which to enable or disable priority tag override. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	Enables or disables priority tag override.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable priority tag override on Fast Ethernet front panel ports 1 through 3:

```
Matrix>set priority classification qtagoverride fe.0.1-3 enable
```

9.3.5 Classification Precedence Rules

NOTE: It is important that you have a comprehensive understanding of the precedence concept before configuring the Matrix E1 device, as these rules can have a significant impact on the network operation.

When there are multiple classifications assigned to a Matrix E1 device, the device must determine which classification takes precedence according to classification precedence rules. By default, the order of precedence is predefined in the Matrix E1 device. When the priority tag override feature is enabled on a port as described in Section 9.3.4.8, 802.1Q frame tags received on that port are assigned a lower precedence. This allows MAC address matching and other types of priority classifications to receive higher precedence.

Table 9-2 lists the ISO layer, associated classification, default precedence levels, and precedence levels with priority tag override enabled.

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NOTE: In Table 9-2, the following applies:

- Exact Match indicates a match of an explicitly defined address.
- Best Match indicates a match of an entire subnet, or range of addresses within a subnet.

Table 9-2 Classification Precedence

Classification Type (IP)	Precedence Level (Default)	With 802.1Q Priority Tag Override
802.1Q frame tag received	**1**	**12**
Source MAC Address Best Match	2	1
Destination MAC Address Best Match	3	2
Source IP Address Exact Match	4	3
Source IP Address Best Match (Subnet)	5	4
Destination IP Address Exact Match	6	5
Destination IP Address Best Match (Subnet)	7	6
UDP / TCP Port Source	8	7
Classification Type (IP)	**Precedence Level (Default)**	**With 802.1Q Priority Tag Override**
UDP / TCP Port Destination	9	8
IP ToS	10	9
IP Type	11	10
Protocol Type (Ether Type or DSAP/SSAP)	12	11
Receive Port	13	13
Classification Type (IPX)	**Precedence Level (Default)**	**With 802.1Q Priority Tag Override**
802.1Q frame tag received	**1**	**10**

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Table 9-2 Classification Precedence (Continued)

Source MAC Address Best Match	2	1
Destination MAC Address Best Match	3	2
Source IPX Network Number	4	3
Destination IPX Network Number	5	4
IPX Source Socket	6	5
IPX Destination Socket	7	6
IPX Class of Service	8	7
IPX Type	9	8
Protocol Type (Ether Type or DSAP/SSAP)	10	9
Receive Port	11	11

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9.3.5.1 set priority classification ingress

Use this command to add ports to a priority classification rule. These ports will then be active for this rule.

set priority classification ingress *priority_value port-string data_meaning data_value* [*data_mask*]

Syntax Description

priority_value	Specifies the number of the port priority (**0** through **7**) being associated with the priority ingress classification list.
port-string	Specifies the port(s) being added to the port priority ingress classification list. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
data_meaning	Specifies the *data_meaning* for the parameter used to classify frames. Refer to Table 9-1 for the list of the *data_meanings* and associated protocol types and classifications.
data _value	Specifies the code of a predefined classifier. The range of codes is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Not required for most data values) Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to add Fast Ethernet front panel ports 30 through 33 to the Ethernet II Type IP classification rule:

```
Matrix>set priority classification ingress 7 fe.0.30-33 ethernet-II-type IP
```

9.3.5.2 clear priority classification ingress

Use this command to remove ports from a priority classification rule.

clear priority classification ingress *priority_value port-string data_meaning data_value* [*data_mask*]

Syntax Description

priority_value	Specifies the number of the port priority (**0** through **7**) being removed from the priority ingress classification list.
port-string	Specifies the port(s) being removed from the port priority ingress classification list. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
data_meaning	The *data_meaning* of the classification ingress entry to be cleared. Refer to Table 9-1 for the list of the *data_meaning* numbers and associated protocol types and classifications.
data _value	Specifies the *data_value* of the classification ingress entry to be cleared. The range of codes is dependent on the *data_meaning*. Refer to Table 9-1 for the limitations.
data_mask	(Not required for most data values) Specifies a value dependent on the *data_value* entered. For details, refer to Table 9-1.

Command Defaults

Data masks are required only for classification types requiring a second *data_value*. For details, refer to Table 9-1.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to clear Fast Ethernet front panel ports 5 to 7 from the Src UDP Range 44 46 classification rule:

```
Matrix>clear priority classification ingress 5 fe.0.5-7 src-udp-range 44 46
```


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9.3.6 Configuring Port Traffic Rate Limiting

Purpose

To limit the incoming rate of traffic entering the Matrix E1 on a per port/priority basis. The allowable range for the rate limiting is as follows:

- For 10/100 ports: 195000 to 100,000,000 bits per second (Bps)
- 1000Base-SX/LX: 195000 to 1,000,000,000 bits per second (Bps)
- 10/100/1000: 195000 to 1,000,000,000 bits per second (Bps)

The inbound rate limit is configured for a given port and list of priorities. The list of priorities can include one, some, or all of the eight 802.1p priority levels. The rate of all traffic entering the port with the priorities configured to that port is not allowed to exceed the programmed limit. If the rate exceeds the programmed limit, frames are dropped until the rate falls below the limit.

Commands

The commands to configure traffic rate limiting are listed below and described in the associated section.

- show port ratelimit (Section 9.3.6.1)
- set port ratelimit (Section 9.3.6.2)
- clear port ratelimit (Section 9.3.6.3)

9.3.6.1 show port ratelimit

Use this command to show the traffic rate limiting configuration on one or more ports.

show port ratelimit [*port-string*]

Syntax Description

port-string	(Optional) Displays rate limiting parameters for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, rate limiting information will be displayed for all ports.

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Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the current rate limits set for Fast Ethernet front panel ports 1 and 2. In this case, rate limiting is globally disabled, and is disabled on these ports. The threshold on all priorities queues within these ports is set to the default value of 195000 bits per second. Frames received on these ports and within these priority queues will be discarded after the rate limiting threshold is reached.

```
Matrix>show port ratelimit fe.0.1-2
 Global Ratelimiting State :  disabled

Threshold   Packet      Port
   Port    Priority  (bits/sec)    Type      Status
 --------  --------  ----------  ---------  --------
 fe.0.1       0          195000   discard   disabled
 fe.0.1       1          195000   discard   disabled
 fe.0.1       2          195000   discard   disabled
 fe.0.1       3          195000   discard   disabled
 fe.0.1       4          195000   discard   disabled
 fe.0.1       5          195000   discard   disabled
 fe.0.1       6          195000   discard   disabled
 fe.0.1       7          195000   discard   disabled
 fe.0.2       0          195000   discard   disabled
 fe.0.2       1          195000   discard   disabled
 fe.0.2       2          195000   discard   disabled
 fe.0.2       3          195000   discard   disabled
 fe.0.2       4          195000   discard   disabled
 fe.0.2       5          195000   discard   disabled
 fe.0.2       6          195000   discard   disabled
 fe.0.2       7          195000   discard   disabled
```


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9.3.6.2 set port ratelimit

Use this command to configure the traffic rate limiting status and threshold (in bits per second) for one or more ports.

set port ratelimit {**disable** | **enable** *port-string priority threshold* {**discard** | **marked**}{**disable** | **enable**}}

Syntax Description

disable | **enable**	Disables or enables rate limiting globally on the device.
port-string	Specifies port(s) on which to set the rate limiting threshold and other parameters. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
priority	Specifies the 802.1D port priority level associated with the *port-string*. Valid values are: • **0 - 7**, with 0 specifying the lowest priority, and • **all** to set the rate limiting threshold and other parameters on all port priority levels associated with the *port-string*.
threshold	Specifies a port rate limiting threshold in bits per second. Range is **195000** up to the maximum bits per second rate for a given interface.
discard | **marked**	Discards all frames, or discards marked frames when set rate limit is reached.
disable | **enable**	Disables or enables the port rate limiting function on selected ports when the global device rate limiting function is enabled.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to:

- globally enable rate limiting on the device,
- configure rate limiting on port priority 5 for Fast Ethernet front panel ports 3 through 7 to a threshold of 20,000 bits per second,
- discard all frames, and enable rate limiting with these parameters on the specified ports:

```
Matrix>set port ratelimit enable
Matrix>set port ratelimit fe.0.3-7 5 200000 discard enable
```

9.3.6.3 clear port ratelimit

Use this command to reset rate limiting parameters back to default values for one or more priorities on one or more ports.

clear port ratelimit *port-string* {*priority*}

Syntax Description

port-string	Specifies a port on which to reset the rate limiting threshold and other parameters. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
priority	Specifies the 802.1D port priority level associated with the *port-string* on which to reset rate limiting. Valid values are: • **0 - 7**, with 0 specifying the lowest priority, and • **all** to reset the rate limiting threshold and other parameters on all port priority levels associated with the *port-string*.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to reset rate limiting on port priority 5 for Fast Ethernet front panel ports 3 through 7:

```
Matrix>clear port ratelimit fe.0.3-7 5
```


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10

IGMP Configuration

This chapter describes the IGMP Configuration set of commands and how to use them.

10.1 IGMP CONFIGURATION SUMMARY

Multicasting is used to support real-time applications such as video conferences or streaming audio. A multicast server does not have to establish a separate connection with each client. It merely broadcasts its service to the network, and any hosts that want to receive the multicast register with their local multicast switch/router. Although this approach reduces the network overhead required by a multicast server, the broadcast traffic must be carefully pruned at every multicast switch/router it passes through to ensure that traffic is only passed to the hosts that subscribed to this service.

The Matrix E1 switch device uses IGMP (Internet Group Management Protocol) to query for any attached hosts who want to receive a specific multicast service. The device looks up the IP Multicast Group used for this service and adds any port that received a similar request to that group. It then propagates the service request on to any neighboring multicast switch/router to ensure that it will continue to receive the multicast service.

For more information about the use of IGMP snooping, refer to Section 10.3.

10.1.1 Process Overview: IGMP Configuration

Use the following steps as a guide in the IGMP configuration process:

1. Enabling / disabling IGMP (Section 10.2.1)
2. Setting IGMP query interval and response time (Section 10.2.2)
3. Reviewing IGMP groups **(**Section 10.2.3)
4. Configuring IGMP VLAN registration (Section 10.2.4)

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10.2 IGMP CONFIGURATION COMMAND SET

10.2.1 Enabling / Disabling IGMP

Purpose

To display IGMP status and to enable or disable IGMP snooping on the device.

Commands

The commands needed to display, enable and disable IGMP are listed below and described in the associated sections as shown.

- show igmp (Section 10.2.1.1)
- set igmp (Section 10.2.1.2)

10.2.1.1 show igmp

Use this command to display IGMP information.

show igmp [**groups** | **query-interval** | **response-time**]

Syntax Description

groups	(Optional) Displays a list of IGMP streams and client connection ports.
query-interval	(Optional) Displays (in seconds) the frequency of host-query frame transmissions.
response-time	(Optional) Displays (in tenths of a second) the maximum query response time.

Command Defaults

If no parameters are specified, IGMP status (enabled or disabled) will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

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Example
This example shows how to display IGMP status:

```
Matrix>show igmp
 IGMP Snooping is disabled.
```

10.2.1.2 set igmp
Use this command to enable or disable IGMP snooping on the device. This allows a host to inform the device it wants to receive transmissions addressed to a specific multicast group.

set igmp {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables IGMP snooping on the device.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Examples
This example shows how to enable IGMP snooping on the device:

```
Matrix>set igmp enable
```

This example shows how to disable IGMP snooping on the device:

```
Matrix>set igmp disable
```


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10.2.2 Setting IGMP Query Interval and Response Time

Purpose

To display and set IGMP query interval and response time settings. These commands work together to remove ports from an IGMP group. Query interval specifies how often IGMP host queries are sent. Response time specifies the maximum query response time.

Commands

The commands needed to display and set IGMP query interval and response time are listed below and described in the associated sections as shown.

- show igmp query-interval (Section 10.2.2.1)
- set igmp query-interval (Section 10.2.2.2)
- show igmp response-time (Section 10.2.2.3)
- set igmp response-time (Section 10.2.2.4)

10.2.2.1 show igmp query-interval

Use this command to display the IGMP query interval setting.

show igmp query-interval

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display IGMP query count status:

```
Matrix>show igmp query-interval
 IGMP query interval is 125 seconds.
```


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10.2.2.2 set igmp query-interval

Use this command to set the IGMP query interval as defined in RFC 2236, Section 8.2.

set igmp query-interval *intervaltime*

Syntax Description

intervaltime	Specifies the frequency of host-query frame transmissions. Valid values are from **30** to **600** seconds.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the IGMP query interval to 60 seconds:

```
Matrix>set igmp query-interval 60
```

10.2.2.3 show igmp response-time

Use this command to display the IGMP response time setting.

show igmp response-time

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the IGMP response time (in tenths of a second):

```
Matrix>show igmp response-time
 IGMP response time is 100 .1 seconds.
```

10.2.2.4 set igmp response-time

Use this command to set the maximum IGMP query response time as defined in RFC 2236, Section 8.3.

set igmp response-time *value*

Syntax Description

value	Specifies the maximum query response time. Valid values are **10** to **255** tenths of a second.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the IGMP response time to 200 tenths of a second:

```
Matrix>set igmp response-time 200
```


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10.2.3 Reviewing IGMP Groups

Purpose

Use this command to display the status of IGMP groups on the device. This includes the VLAN port configured to transmit IGMP multicast transmissions, its VLAN ID, and the IP addresses of the ports asking to receive those transmissions as part of the IGMP group.

Command

The command used to display IGMP groups is listed below and described in the associated section as shown.

- show igmp groups (Section 10.2.3.1)

10.2.3.1 show igmp groups

Use this command to display a list of IGMP streams and client connection ports.

show igmp groups

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display IGMP groups. In this example, the device knows to forward all multicast traffic for IP address 224.47.239.73 to Fast Ethernet front panel ports 25, 31, 43, and 47:

```
Matrix>show igmp groups
 Vlan Id = 1     MultiCast IP =  224.47.239.73     Type = IGMP

  IGMP Port List =   fe.0.25, fe.0.31, fe.0.43, fe.0.47
-------------------------------------------------------------
 Multicast group list processed.
```


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Table 10-1 provides details of the command output.

Table 10-1 show igmp groups Output Details

Output	What It Displays...
Vlan ID	VLAN segment configured for IGMP.
Multicast IP	IP address associated with the VLAN ID through which all multicast traffic is forwarded.
Type	Protocol type, which is IGMP.
IGMP Port List	Port designation(s) wishing to receive multicast transmissions. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

This example shows the display when no IGMP groups have been configured on the device:

```
Matrix>show igmp groups
Multicast group list processed.
```


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10.2.4 Configuring IGMP VLAN Registration

Purpose

Use these commands to configure IGMP VLAN Registration (IVR) on the device. IVR is designed for applications using wide-scale deployment of multicast traffic. It eliminates the need to duplicate multicast traffic for clients in each VLAN. Multicast traffic for all groups is only sent around the VLAN trunk once — only on the multicast VLAN.

NOTE: IVR cannot be used when routing is enabled.

For more information about the use of IGMP VLAN Registration, refer to Section 10.3.1.

Command

The command used to configure IGMP VLAN registration are listed below and described in the associated sections as shown.

- show igmp mode (Section 10.2.4.1)
- set igmp mode vlan (Section 10.2.4.2)
- set igmp mode ipaddress (Section 10.2.4.3)
- set igmp mode (Section 10.2.4.4)

10.2.4.1 show igmp mode

Use this command to display IVR information for one or more ports.

show igmp mode [*port-string*]

Syntax Description

port-string	(Optional) Displays IVR information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If port-string is not specified, IVR information will be displayed for all ports.

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Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display IVR information for front panel Fast Ethernet ports 1 through 3:

```
Matrix>show igmp mode fe.0.1-3
 IGMP MODE VLAN:  1
 IGMP MODE IP: 10.1.2.3

 Port       Mode     Port        Mode     Port       Mode
 ------------------------------------------------------------
 fe.0.1     open     fe.0.2      open    fe.0.3     open
```

Table 10-2 provides details of the command output.

Table 10-2 show igmp mode Output Details

Output	What It Displays...
IGMP MODE VLAN	VLAN segment to be used by all ports running in IGMP open mode.
IGMP MODE IP	Virtual IP address associated with the VLAN ID through which all multicast traffic is forwarded.
Port	Port designation.
Type	Whether or not the port's IVR registration is: • **Open** — scoping multicast transmissions to the IGMP VLAN. These ports are user access ports subscribing to receive multicast streams via the IGMP registered VLAN. • **Secure** — scoping multicast transmissions to the VLAN receiving the IGMP requests.

10.2.4.2 set igmp mode vlan

Use this command to set the VLAN registered to forward multicast traffic to all subscribing, or "open" ports.

set igmp mode vlan *vlan_id*

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Syntax Description

vlan_id	Specifies the IGMP registered VLAN.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set VLAN 1 as an IGMP registered VLAN:

```
Matrix>set igmp mode vlan 1
```

10.2.4.3 set igmp mode ipaddress

Use this command to set the virtual IP address through which multicast traffic will be forwarded to all subscribing, or "open" ports.

set igmp mode ipaddress *ip_address*

Syntax Description

ip_address	Specifies the virtual IP address associated with the *vlan_id* used in the **set igmp mode vlan** command (Section 10.2.4.2).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the IGMP mode IP address to 10.1.2.3:

```
Matrix>set igmp mode ipaddress 10.1.2.3
```

10.2.4.4 set igmp mode

Use this command to configure IVR ports as open or secure. Open ports will scope multicast transmissions to the IGMP VLAN. These ports are user access ports subscribing to receive multicast streams via the IGMP registered VLAN specified in the **set igmp mode vlan** command (Section 10.2.4.2). Ports in secure mode will scope multicast transmissions to the VLAN receiving the IGMP requests.

set igmp mode *port-string* {**open** | **secure**}

Syntax Description

port-string	Specifies port(s) for which to set IGMP mode. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
open | **secure**	Specifies the port(s) IGMP mode as open (scoping to the IGMP VLAN), or secure (scoping to the VLAN receiving IGMP requests).

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the IGMP mode to open for front panel Fast Ethernet ports 1 through 3:

```
Matrix>set igmp mode fe.0.1-3 open
```


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10.3 ABOUT IGMP

The Internet Group Management Protocol (IGMP) runs between hosts and their immediately neighboring multicast switch device. The protocol's mechanisms allow a host to inform its local switch device that it wants to receive transmissions addressed to a specific multicast group.

A multicast-enabled switch device can periodically ask its hosts if they want to receive multicast traffic. If there is more than one switch device on the LAN performing IP multicasting, one of these devices is elected "querier" and assumes the responsibility of querying the LAN for group members.

Based on the group membership information learned from IGMP, a switch device can determine which (if any) multicast traffic needs to be forwarded to each of its ports. At Layer-3, multicast switch devices use this information, along with a multicast routing protocol, to support IP multicasting across the Internet.

IGMP provides the final step in an IP multicast packet delivery service since it is only concerned with forwarding multicast traffic from the local switch device to group members on a directly attached subnetwork or LAN segment.

This switch device supports multicast group management by

- passively snooping on the IGMP query and IGMP report packets transferred between IP multicast switches and IP multicast host groups to learn IP multicast group members, and
- actively sending IGMP query messages to solicit IP multicast group members.

The purpose of multicast group management is to optimize a switched network's performance so multicast packets will only be forwarded to those ports containing multicast group hosts or multicast switch devices instead of flooding to all ports in the subnet (VLAN).

In addition to passively monitoring IGMP query and report messages, the Matrix E1 can also actively send IGMP query messages to learn locations of multicast switches and member hosts in multicast groups within each VLAN.

However, note that IGMP neither alters nor routes any IP multicast packets. Since IGMP is not concerned with the delivery of IP multicast packets across subnetworks, an external IP multicast switch device is needed if IP multicast packets have to be routed across different subnetworks.

10.3.1 IGMP VLAN Registration

IGMP VLAN Registration (IVR) is designed for applications using wide-scale deployment of multicast traffic. For example, the broadcast of multiple television channels over a campus network or multi-tenant environment. IVR allows a user on a port to subscribe and unsubscribe to a multicast stream on the network-wide multicast VLAN, using IGMP open mode. It allows the single

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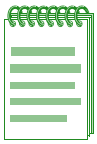
multicast VLAN to be shared in the network while subscribers remain in separate VLANs. IVR provides the ability to continuously send multicast streams in the multicast VLAN, but to isolate the streams from the subscriber VLANs for bandwidth and security reasons.



NOTE: IVR cannot be used when routing is enabled.

IVR eliminates the need to duplicate multicast traffic for clients in each VLAN. Multicast traffic for all groups is sent around the VLAN trunk once — only on the multicast VLAN. Although the IGMP join and leave messages are scoped to the VLAN to which the client port is assigned, these messages dynamically register for streams of multicast traffic in the multicast VLAN. The switch modifies the forwarding behavior to allow the traffic to be forwarded from the multicast VLAN to the client port in a different VLAN, selectively allowing traffic to cross between two VLANs.

To use IVR, only user access ports should be configured in open mode. The switch identifies clients that are in open mode and will remap IGMP traffic to the IGMP VLAN. It will also remap the client source IP address to the IGMP IP address. It is possible for all the switches to use the same IGMP mode IP address, as long as that IP address is valid for the IGMP VLAN.

If GVRP is enabled, the IGMP VLAN will be propagated dynamically through the network using the GVRP protocol. For more information on GVRP, refer to Section 7.3.8.

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11

Logging and Switch Network Management

This chapter describes switch-related logging and network management commands and how to use them.

NOTE: The commands in this section pertain to network management of the Matrix E1 device when it is in **switch mode** only. For information on router-related network management tasks, including reviewing router ARP tables and IP traffic, refer to Chapter 12.

11.1 PROCESS OVERVIEW: LOGGING AND NETWORK MANAGEMENT

Switch-related logging and network management tasks include the following:

- Configuring System Logging (Section 11.2.1)
- Monitoring Switch Network Events and Statistics (Section 11.2.2)
- Managing Switch Network Addresses (Section 11.2.3)
- Configuring Simple Network Time Protocol (SNTP) (Section 11.2.4)
- Configuring Node Aliases (Section 11.2.5)
- Configuring Convergence End Points (CEP) phone detection (Section 11.2.6)

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11.2 LOGGING AND NETWORK MANAGEMENT COMMAND SET

11.2.1 Configuring System Logging

Purpose

To display and configure system logging, including Syslog server settings, logging severity levels for various applications, and Syslog default settings.

Commands

Commands to configure system logging are listed below and described in the associated section as shown.

- set logging (Section 11.2.1.1)
- show logging all (Section 11.2.1.2)
- show logging console (Section 11.2.1.3)
- set logging console (Section 11.2.1.4)
- show logging server (Section 11.2.1.5)
- set logging server (Section 11.2.1.6)
- clear logging server (Section 11.2.1.7)
- show logging default (Section 11.2.1.8)
- set logging default (Section 11.2.1.9)
- clear logging default (Section 11.2.1.10)
- show logging application (Section 11.2.1.11)
- set logging application (Section 11.2.1.12)
- clear logging application (Section 11.2.1.13)
- show logging audit-trail (Section 11.2.1.14)
- copy audit-trail (Section 11.2.1.15)

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11.2.1.1 set logging

Use this command to globally disable or re-enable Syslog on the device.

set logging {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables Syslog.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to disable Syslog:

```
Matrix>set logging disable
```

11.2.1.2 show logging all

Use this command to display all configuration information for system logging.

show logging all

NOTE: Most system messages are logged at severity level of 6 (Notice). By default, the logging applications are set to 5 (Warning), which will suppress level 6 (Notice) messages from the console session. To view most of the logging of configuration messages on the console session, ACL hits etc., the **set logging application** command should be used as described in Section 11.2.1.12 to set the logging level for applications to 6 or higher.

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display all system logging information:

```
Matrix>show logging all

Global Logging State: Enabled

       Application    Current Severity Level
-------------------------------------------
0      default                6
1      GARP                   5
2      MSTP                   5
3      IGMP                   5
4      LAG                    5
5      FilterDb               5
6      hostVx                 5
7      CDP                    5
8      RMON                   5
9      Policy                 5
10     Syslog                 5
11     RatePol                5
12     rtrFE                  6
13     RtrCfg                 5
14     etsVlan                5
15     rtrACL                 5
16     MII                    5
17     Envoy                  5
18     SSH                    5
19     RtrDvmrp               5
20     RtrOspf                5
21     Eapol                  5
22     Radius                 5
23     Trunking               5
24     CiscoDP                5
25     MacAuth                5
26     Alias                  5
27     SNMP                   5
28     sntp                   5
29     CLI                    5
30     Telnet                 5
31     SysDownload            5
32     PortMirroring          5
33     Webview                5
-- More --
```


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```
Matrix>show logging all  (Continued from previous page)

emergencies(1)          alerts(2)              critical(3)
errors(4)               warnings(5)            notifications(6)
information(7)          debugging(8)

Minimum message level displayed on the console session: warnings(5)


              Facility      Severity          Port
            ------------------------------------------------------------
Defaults:     local0        emergencies(1)    514


    IP Address       Facility     Severity          Port   Status
-------------------------------------------------------------------------
1   10.1.129.55      local0       notifications(6)  514    active
1      Desc:Routing
```

Table 11-1 provides an explanation of the command output.

Table 11-1 show logging all Output Details

Output	What It Displays...
Global Logging State	Whether logging is globally **enabled** or **disabled**.
Application	Mnemonic values for applications being logged. For details on setting this value using the **set logging application** command, refer to Section 11.2.1.12. For a list of valid values and their corresponding applications, refer to Table 11-3.
Current Severity Level	Severity level (**1 - 8**) at which the server is logging messages for the listed application. For details on setting this value using the **set logging application** command, refer to Section 11.2.1.12.
Defaults	Default facility name, severity level and UDP port designation (as described below.) For details on setting this value using the **set logging default** command, refer to Section 11.2.1.9.
IP Address	Syslog server's IP address. For details on setting this using the **set logging server** command, refer to Section 11.2.1.6.

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Table 11-1 show logging all Output Details (Continued)

Output	What It Displays...
Facility	Syslog facility that will be encoded in messages sent to this server. Valid values are: **local0** to **local7**.
Severity	Severity level at which the server is logging messages.
Description	Text string description of this facility/server.
Port	UDP port the client uses to send to the server.
Status	Whether or not this Syslog configuration is currently enabled or disabled.

11.2.1.3 show logging console

Use this command to display the global logging state and the severity level at which logging messages will display to the console port.

show logging console

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This command shows how to display console logging settings. In this case, logging is globally enabled and the severity level is set to 8 so that debugging level messages will be shown on the console. For an explanation of the command output, refer back to Table 11-1.

```
Matrix>show logging console
Global Logging State: Enabled
Logging console session: debugging(8)
```


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11.2.1.4 set logging console

Use this command to set the severity level at which Syslog messages will display to the console, or prevent Syslog messages from displaying to the console.

set logging console {*severity* | **disable**}

Syntax Description

severity	Specifies the severity level at which log messages will display to the console. Valid values and corresponding levels are: **1** - emergencies (system is unusable) **2** - alerts (immediate action required) **3** - critical conditions **4** - error conditions **5** - warning conditions **6** - notifications (significant conditions) **7** - informational messages **8** - debugging messages
disable	Prevents logging messages from displaying to the console.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to set the console logging severity level to 3.

```
Matrix>set logging console 3
```

11.2.1.5 show logging server

Use this command to display the Syslog configuration for a particular server.

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show logging server [*index*]

Syntax Description

index	(Optional) Displays Syslog information pertaining to a specific server table entry. Valid values are **1**-**8**.

Command Defaults

If *index* is not specified, all Syslog server information will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This command shows how to display Syslog server configuration information. For an explanation of the command output, refer back to Table 11-1.

```
Matrix>show logging server

   IP Address       Facility     Severity          Port   Status
-------------------------------------------------------------------------
1 10.1.10.111      local7       warnings(5)       514    active
1    Desc:default
```


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11.2.1.6 set logging server

Use this command to configure a Syslog server.

set logging server *index* {**ip_addr** *ip_addr* | **facility** *facility* | **severity** *severity* | **descr** *descr* | **port** *port* | **state** [**enable** | **disable**]}

Syntax Description

index	Specifies the server table index number for this server. Valid values are **1** - **8**.
ip_addr *ip_addr*	Specifies the Syslog message server's IP address.
facility *facility*	Specifies the server's facility name. Valid values are: **local0** to **local7**.
severity *severity*	Specifies the severity level at which the server will log messages. Valid values and corresponding levels are: **1** - emergencies (system is unusable) **2** - alerts (immediate action required) **3** - critical conditions **4** - error conditions **5** - warning conditions **6** - notifications (significant conditions) **7** - informational messages **8** - debugging messages
descr *descr*	Specifies a textual string description of this facility/server.
port *port*	Specifies the default UDP port the client uses to send to the server.
state enable | **disable**	Enables or disables this facility/server configuration.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This command shows how to enable a Syslog server configuration for index 1, IP address 134.141.89.113, facility local4, severity level 8 (debugging) port 514:

```
Matrix>set logging server 1 ip_addr 134.141.89.113 facility local4 severity 8
port 514 state enable
```

11.2.1.7 clear logging server

Use this command to remove a server from the Syslog server table.

clear logging server *index*

Syntax Description

index	Specifies the server table index number for the server to be removed. Valid values are **1 - 8**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to remove the Syslog server with index 1 from the server table:

```
Matrix>clear logging server 1
```

11.2.1.8 show logging default

Use this command to display the Syslog server default values.

show logging default

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Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This command shows how to display the Syslog server default values. For an explanation of the command output, refer back to Table 11-1.

```
Matrix>show logging default

              Facility      Severity          Port
            ------------------------------------------------------------
Defaults:     local7        warnings(5)       514
```

NOTE: Most system messages are logged at severity level of 6 (Notice). By default, the logging applications are set to 5 (Warning), which will suppress level 6 (Notice) messages from the console session. To view most of the logging of configuration messages on the console session, ACL hits etc., the **set logging application** command should be used as described in Section 11.2.1.12 to set the logging level for applications to 6 or higher.

11.2.1.9 set logging default

Use this command to set logging default values.

set logging default {**facility** *facility* | **severity** *severity* | **port** *port*}

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Syntax Description

facility *facility*	Specifies the default facility name. Valid values are: **local0** to **local7**.
severity *severity*	Specifies the default logging severity level. Valid values and corresponding levels are: **1** - emergencies (system is unusable) **2** - alerts (immediate action required) **3** - critical conditions **4** - error conditions **5** - warning conditions **6** - notifications (significant conditions) **7** - informational messages **8** - debugging messages
port *port*	Specifies the default UDP port the client uses to send to the server.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to set the Syslog default facility name to local2 and the severity level to 4 (error logging):

```
Matrix>set logging default facility local2 severity 4
```


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11.2.1.10clear logging default

Use this command to reset logging default values.

clear logging default [**facility**] [**severity**] [**port**]

Syntax Description

facility	(Optional) Resets the default facility name to **local7**.
severity	(Optional) Resets the default logging severity level to **5** (warning conditions).
port	(Optional) Resets the default UDP port the client uses to send to the server to **514**.

Command Defaults

If no parameters are specified, all logging default values will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This command shows how to reset the Syslog default severity level to 5:

```
Matrix>clear logging default severity
```

11.2.1.11show logging application

Use this command to display the severity level of Syslog messages for applications.

show logging application

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Only.

Example

This command shows a portion of the information displayed with the **show logging application** command. For a full list of supported applications, refer to Table 11-3.

```
Matrix>show logging application

Application    Current Severity Level
-------------------------------------------
1      default
2      Syslog                5
3      rtrFE                 5
4      RtrCfg                5
5      etsVlan               5
6      SSH                   5
7      rtrDvmrp              5
8      rtrOspf               5
-- More --
```

Table 11-2 provides an explanation of the command output.

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Table 11-2 show logging application Output Details

Output	What It Displays...
Application	Mnemonic values for applications being logged. For details on setting this value using the **set logging application** command, refer to Section 11.2.1.12. For a list of valid values and their corresponding applications, refer to Table 11-3.
Current Severity Level	Severity level (from 1 to 8) at which the server is logging messages for the listed application. **NOTE:** Most system messages are logged at severity level of 6 (Notice). By default, the logging applications are set to 5 (Warning), which will suppress level 6 (Notice) messages from the console session. To view most of the logging of configuration messages on the console session, ACL hits etc, the **set logging application** command should be used as described in Section 11.2.1.12 to set the logging level for applications to 6 or higher.

11.2.1.12set logging application

Use this command to set the severity level of log messages for an application.

set logging application {*mnemonic* | **all**} *level*

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Syntax Description

mnemonic	Specifies a case sensitive mnemonic value of an application to be logged. Valid values and their corresponding applications are listed in Table 11-3.
all	Resets the severity level for all applications.
level	Specifies the severity level at which the server will log messages for applications. Valid values and corresponding levels are: **1** - emergencies (system is unusable) **2** - alerts (immediate action required) **3** - critical conditions **4** - error conditions **5** - warning conditions **6** - notifications (significant conditions) **7** - informational messages **8** - debugging messages

NOTES: Mnemonic values are case sensitive and must be typed as they appear in Table 11-3.

Most system messages are logged at severity level of 6 (Notice). By default, the logging applications are set to 5 (Warning), which will suppress level 6 (Notice) messages from the console session. To view most of the logging of configuration messages on the console session, ACL hits etc, the **set logging application** command should be used to set the logging level for applications to 6 or higher.

Session-oriented events, such as ACL hits and classification matches, will display notification messages periodically with a counter, while other actions will trigger logging for each event.

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Table 11-3 Mnemonic Values for Logging Applications

Mnemonic	Application
default	Applications not explicitly included in Matrix E1 device.
GARP	802.1D Generic Attribute Resolution Protocol (GVR/GMRP)
MSTP	802.1D Spanning Tree (802.1w/802.1s)
BrdgMIB	IETF Bridge MIB component
IGMP	Internet Group Management Protocol
FilterDb	802.1D/Q compliant filter database
hostVx	Host interface services
CDP	CDP discovery protocol
RMON	Remote Monitoring Services
Policy	L2/L3/L4 Packet Policy/Classification Services
Syslog	Syslog Service
RatePol	Rate Policing (Limiting) Services
rtrFE	Router Forwarding Engine
RtrCfg	Router Debug Configuration
etsVlan	VLAN Interface Manager
rtrACL	Router Access Control Lists
MII	Physical port MII driver
SSH	Secure Shell
rtrDvmrp	Distance Vector Multicast Routing Protocol
rtrOspf	Open Shortest Path First Routing Protocol
Eapol	Extensible Authentication Protocol

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Table 11-3 Mnemonic Values for Logging Applications (Continued)

Mnemonic	Application
Radius	RADIUS client/server
Trunking	Port trunking
MacAuth	MAC authentication
Alias	Node and alias
SNMP	Simple Network Management Protocol
sntp	Simple Network Time Protocol
CLI	Command Line Interface
Telnet	Telnet server and client
SysDownload	System download
PortMirroring	Port mirroring (redirect)
Webview	Enterasys' WebView management application

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the severity level for the Secure Shell application to 4 so that error conditions will be logged for that application:

```
Matrix>set logging application SSH 4
```


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11.2.1.13clear logging application

Use this command to reset the logging severity level for one or all applications to the default value of 5 (warning conditions).

clear logging application {*mnemonic* | **all**}

Syntax Description

mnemonic	Resets the severity level for a specific application. Valid mnemonic values and their corresponding applications are listed in Table 11-3.
all	Resets the severity level for all applications.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the logging severity level for SSH:

```
Matrix>clear logging application SSH
```

11.2.1.14show logging audit-trail

Use this command to display the contents of a logging audit trail file. This will be a record of all events that occur when users request and use specific system resources. The device can store up to 200 messages.

show logging audit-trail [*file*]

Syntax Description

file	(Optional) Displays a specific audit-trail log file.

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Command Defaults

If *file* is not specified, the latest 200 Syslog messages stored in the audit-trail log will be displayed.

Command Type

Switch command.

Command Mode

Super User.

Example

This example shows an excerpt of the output from the show logging audit-trail command:

```
Matrix>show logging audit-trail
132 <5>Apr  7 14:14:07.48 10.1.130.14 rtrFE[HOST_DISP_](host)Bad Source Address
detect from interface vlan 3 with a source address of 127.0.2.3 destined to 10.1
.129.78, Packet Dropped
```

11.2.1.15copy audit-trail

Use this command to copy the Syslog audit trail history buffer to a target file.

copy audit-trail *destination*

Syntax Description

destination	Specifies the target file where the Syslog audit trail will be copied. This can be a local file in NVRAM or a file on a TFTP server.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This command shows how to copy the audit trail history buffer to msgs.log file on the Syslog server:

```
Matrix>copy audit-trail tftp://172.43.10.77/msgs.log
```

11.2.2 Monitoring Switch Network Events and Status

Purpose

To display switch events and command history, to set the size of the history buffer, and to display network and RMON statistics.

Commands

Commands to monitor switch network events and status are listed below and described in the associated section as shown.

- show eventlog (Section 11.2.2.1)
- clear eventlog (Section 11.2.2.2)
- history (Section 11.2.2.3)
- repeat (Section 11.2.2.4)
- show history (Section 11.2.2.5)
- set history (Section 11.2.2.6)
- show netstat (Section 11.2.2.7)
- show rmon stats (Section 11.2.2.8)
- show users (Section 11.2.2.9)
- disconnect (Section 11.2.2.10)

11.2.2.1 show eventlog

Use this command to display system events for the switch.

show eventlog

Syntax Description

None.

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Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Only.

Example
This example shows how to use the **show eventlog** command:

```
Matrix>show eventlog
07/01/2001 16:57:28- (Info     ) system started
07/02/2001 08:29:13- (Info     ) system started
07/04/2001 09:21:28- (Info     ) system started
```

11.2.2.2 clear eventlog
Use this command to delete all entries from the system event log.

clear eventlog

Syntax Description
None.

Command Defaults
None.

Command Type
Switch Command.

Command Mode
Read-Write.

Example
This example shows how to clear the event log:

```
Matrix>clear eventlog
```


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11.2.2.3 history

Use this command to display the contents of the command history buffer. The command history buffer includes all the switch commands entered up to a maximum of 32, as specified in the **set history** command (Section 11.2.2.6).

history

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the contents of the command history buffer. It shows there are five commands in the buffer:

```
Matrix>history
 1 show arp
 2 history
 3 show ip
 4 show cdp fe.0.1
 5 history
```

11.2.2.4 repeat

Use this command to repeat a command shown in the command history buffer.

repeat [*cmd_num*] [*iterations*]

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Syntax Description

cmd_num	(Optional) Specifies the number of the command from the **history** display.
iterations	(Optional) Specifies the number of times to re-execute the command. Valid values are **0** to **2147483647**. Entering **0** causes the specified *cmd_num* to be repeated endlessly until the user enters Ctrl+C.

Command Defaults

If no parameters are specified, the last command will be repeated.

Command Type

Switch.

Command Mode

Read-Write.

Example

This example shows how to repeat *cmd_num* 1 (**show arp** in the history buffer display). It is repeated once:

```
Matrix>history
 1 show arp
 2 history
 3 show ip
 4 show cdp fe.0.1
 5 history
Matrix>repeat 1 1

Matrix>show arp

LINK LEVEL ARP TABLE

destination      gateway            flags  Refcnt  Use           Interface
------------------------------------------------------------------------------
10.1.0.1         00:00:1d:bc:df:bf    405    1       0             host0
10.1.10.10       00:00:1d:1f:27:26    405    0       11338         host0
------------------------------------------------------------------------------
```


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11.2.2.5 show history

Use this command to display the size (in lines) of the history buffer.

show history

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the size of the history buffer:

```
Matrix>show history
 History buffer size: 3
```

11.2.2.6 set history

Use this command to set the size of the history buffer.

set history *size*

Syntax Description

size	Specifies the size of the history buffer in lines. Valid values are from **1** to **32**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the size of the command history buffer to 3 lines:

```
Matrix>set history 3
```

11.2.2.7 show netstat

Use this command to display statistics for the switch's active network connections.

show netstat [**icmp** | **interface** | **ip** | **routes** | **stats** | **tcp** | **udp**]

Syntax Description

icmp	(Optional) Displays Internet Control Message Protocol (ICMP) statistics.
interface	(Optional) Displays interface statistics.
ip	(Optional) Displays Internet Protocol (IP) statistics.
routes	(Optional) Displays the IP routing table.
stats	(Optional) Displays all statistics for TCP, UDP, IP, and ICMP.
tcp	(Optional) Displays Transmission Control Protocol (TCP) statistics.
udp	(Optional) Displays User Datagram Protocol (UDP) statistics.

Command Defaults

If no parameters are specified, **show netstat** will be executed as shown in the example below.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display statistics for all the current active network connections:

```
Matrix>show netstat
Active Internet connections (including servers)
PCB      Proto Recv-Q Send-Q  Local Address      Foreign Address    (state)
-------- ----- ------ ------  ------------------ ------------------ -------
1cc6314  TCP        0      0  0.0.0.0.80         0.0.0.0.0          LISTEN
1cc6104  TCP        0      0  0.0.0.0.23         0.0.0.0.0          LISTEN
1cc6290  UDP        0      0  0.0.0.0.162        0.0.0.0.0
1cc620c  UDP        0      0  0.0.0.0.161        0.0.0.0.0
```

Table 11-4 provides an explanation of the command output.

Table 11-4 show netstat Output Details

Output	What It Displays...
PCB	Protocol Control Block designation.
Proto	Type of protocol running on the connection.
Recv-Q	Number of queries received over the connection.
Send-Q	Number of queries sent over the connection.
Local Address	IP address of the connection's local host.
Foreign Address	IP address of the connection's foreign host.
(state)	Communications mode of the connection (listening, learning or forwarding).

11.2.2.8 show rmon stats

Use this command to display RMON statistics for one or more ports.

show rmon stats [*port-string*]

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Syntax Description

port-string	(Optional) Displays RMON statistics for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, RMON stats will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RMON statistics for Fast Ethernet expansion module 1, port 1:

```
Matrix>show rmon stats fe.1.1

Index 1

---------------------

Status           = 1 (active)
Owner            =
Data Source      =

Drop Events      = 5               Jabbers             = 515
Collisions       = 230             Octets              = 12455
Packets          = 12164           0    -   64 Octets  = 1894
Broadcast Pkts   = 1894            65   -  127 Octets  = 732
Multicast Pkts   = 732             128  -  255 Octets  = 541
CRC Errors       = 35              256  -  511 Octets  = 21
Undersize Pkts   = 80              512  - 1023 Octets  = 8943
Oversize Pkts    = 5               1024 - 1518 Octets  = 33
Fragments        = 0
```

Table 11-5 provides an explanation of the command output.

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Table 11-5 show rmon stats Output Details

Output	What It Displays...
Index	Current Ethernet interface for which statistics are being shown. The device has an embedded RMON agent that gathers statistics for each interface.
Status	Current operating status of the displayed interface.
Owner	Name of the entity that configured this entry.
Data Source	Data source of the statistics being displayed.
Drop Events	Total number of times that the RMON agent was forced to discard frames due to lack of available switch device resources. This does not display the number of frames dropped, only the number of times the RMON agent was forced to discard frames.
Collisions	Total number of collisions that have occurred on this interface.
Packets	Total number of frames (including bad frames, broadcast frames, and multicast frames) received on this interface.
Broadcast Pkts	Total number of good frames that were directed to the broadcast address. This value does not include multicast frames.
Multicast Pkts	Total number of good frames that were directed to the multicast address. This value does not include broadcast frames.
CRC Errors	Number of frames with bad Cyclic Redundancy Checks (CRC) received from the network. The CRC is a 4-byte field in the data frame that ensures that the data received is the same as the data that was originally sent.
Undersize Pkts	Number of frames received containing less than the minimum Ethernet frame size of 64 bytes (not including the preamble) but having a valid CRC.
Oversize Pkts	Number of frames received that exceeded 1516 data bytes (not including the preamble) but had a valid CRC.

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Table 11-5 show rmon stats Output Details (Continued)

Output	What It Displays...
Fragments	Number of received frames that are not the minimum number of bytes in length, or received frames that had a bad or missing Frame Check Sequence (FCS), were less than 64 bytes in length (excluding framing bits, but including FCS bytes) and had an invalid CRC. It is normal for this value to increment since fragments are a normal result of collisions in a half-duplex network.
Jabbers	Total number of frames that were greater than 1518 bytes and had either a bad FCS or a bad CRC.
Octets	Total number of octets (bytes) of data, including those in bad frames, received on this interface.
0 – 64 Octets	Total number of frames, including bad frames, received that were 64 bytes in length (excluding framing bits, but including FCS bytes).
65 – 127 Octets	Total number of frames, including bad frames, received that were between 65 and 127 bytes in length (excluding framing bits, but including FCS bytes).
128 – 255 Octets	Total number of frames, including bad frames, received that were between 128 and 255 bytes in length (excluding framing bits, but including FCS bytes).
256 – 511 Octets	Total number of frames, including bad frames, received that were between 256 and 511 bytes in length (excluding framing bits, but including FCS bytes).
512 – 1023 Octets	Total number of frames, including bad frames, received that were between 512 and 1023 bytes in length (excluding framing bits, but including FCS bytes).
1024 – 1518 Octets	Total number of frames, including bad frames, received that were between 1024 and 1518 bytes in length (excluding framing bits, but including FCS bytes).

11.2.2.9 show users

Use this command to display information about the active console port or Telnet session(s) logged in to the switch.

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show users

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to use the **show users** command. In this output, there is one Telnet user at IP address 10.1.10.10:

```
Matrix>show users
Console Port
------------
Active
Number of telnet users: 1
Telnet Session Users
--------------------
10.1.10.10
```


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11.2.2.10disconnect

Use this command to close an active console port or Telnet session when operating in switch mode.

disconnect {*ip_address* | **console**}

Syntax Description

ip_address	Specifies the IP address of the Telnet session to be disconnected. This address is displayed in the output shown in Section 11.2.2.9.
console	Closes an active console port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to close a Telnet session to host 10.1.10.10:

```
Matrix>disconnect 10.1.10.10
```

This example shows how to close the current console session:

```
Matrix>disconnect console
```

11.2.3 Managing Switch Network Addresses

Purpose

To display, add or delete switch ARP table entries, to display or set the status of RAD (Runtime Address Discovery) protocol, to display or delete MAC address information, to configure MAC address aging time, to configure DNS, and to execute PING and traceroute.

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Commands

Commands to manage switch network addresses are listed below and described in the associated section as shown.

- show arp (Section 11.2.3.1)
- set arp (Section 11.2.3.2)
- clear arp (Section 11.2.3.3)
- show rad (Section 11.2.3.4)
- set rad (Section 11.2.3.5)
- show mac (Section 11.2.3.6)
- set mac (Section 11.2.3.7)
- clear mac (Section 11.2.3.8)
- show mac agingtime (Section 11.2.3.9)
- set mac agingtime (Section 11.2.3.10)
- clear mac agingtime (Section 11.2.3.11)
- show port stopaging (Section 11.2.3.12)
- set port stopaging (Section 11.2.3.13)
- clear port stopaging (Section 11.2.3.14)
- set mac algorithm (Section 11.2.3.15)
- show dns (Section 11.2.3.16)
- set dns domain (Section 11.2.3.17)
- clear dns domain (Section 11.2.3.18)
- set dns server (Section 11.2.3.19)
- clear dns server (Section 11.2.3.20)
- clear dns (Section 11.2.3.21)
- ping (Section 11.2.3.22)
- traceroute (Section 11.2.3.23)
- set mac multicast (Section 11.2.3.24)
- show mac multicast (Section 11.2.3.25)

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11.2.3.1 show arp

Use this command to display the switch's ARP table.

show arp

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the ARP table:

```
Matrix>show arp

LINK LEVEL ARP TABLE

destination      gateway            flags  Refcnt  Use           Interface
-------------------------------------------------------------------------
10.1.0.1         00:00:1d:bc:df:bf    405    1       0             host0
10.1.10.10       00:00:1d:1f:27:26    405    0       11338         host0
-------------------------------------------------------------------------
```

11.2.3.2 set arp

Use this command to add mapping entries to the switch's ARP table.

set arp *ip_address mac_address* [**temp**] [**pub**] [**trail**]

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Syntax Description

ip_address	Specifies the IP address to map to the MAC address and add to the ARP table.
mac_address	Specifies the MAC address to map to the IP address and add to the ARP table.
temp	(Optional) Sets the ARP entry as not permanent. This allows the entry to time out.
pub	(Optional) Publishes the specified ARP entry. This causes the system to respond to ARP requests for this entry, even though it is not the host.
trail	(Optional) Specifies that trailer encapsulations can be sent to this host.

Command Defaults

- If **temp** is not specified, the ARP entry will be added as a permanent entry.
- If **pub** is not specified, then the ARP entry will not be published.
- If **trail** is not specified, then trailer encapsulations will not be sent to the host.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to map IP address 198.133.219.232 to MAC address 00-00-0c-40-0f-bc:

```
Matrix>set arp 198.133.219.232 00-00-0c-40-0f-bc
```

11.2.3.3 clear arp

Use this command to delete a specific entry or all entries from the switch's ARP table.

clear arp [*hostname* | *ip_address*]

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Syntax Description

hostname | *ip_address*	(Optional) Specifies the IP address in the ARP table to be cleared. An IP alias or host name that can be resolved through the DNS can be specified instead of an IP address.

Command Defaults

If *hostname* or *ip_address* are not specified, all ARP entries will be cleared.

Command Mode

Read-Write.

Example

This example shows how to delete entry 10.1.10.10 from the ARP table:

```
Matrix>clear arp 10.1.10.10
```

11.2.3.4 show rad

Use this command to display the status of the RAD (Runtime Address Discovery) protocol on the switch.

show rad

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display RAD status:

```
Matrix>show rad
 RAD is currently enabled.
```


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11.2.3.5 set rad

Use this command to enable or disable RAD (Runtime Address Discovery) protocol. The Matrix E1 uses BOOTP/DHCP to obtain an IP address if one hasn't been configured. RAD can also be used to retrieve a text configuration file from the network.

NOTE: In order for RAD to retrieve a text configuration file, the file must be specified in the BootP tab.

set rad {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables RAD.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable RAD:

```
Matrix>set rad disable
```

11.2.3.6 show mac

Use this command to display MAC addresses information in the switch's routing table.

show mac [**address** *mac address*] [**fid** *vlan_id*] [**port** *port-string*] [**type** {**learned** | **self** | **mgmt**}]

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Syntax Description

address *mac address*	(Optional) Displays information for a specific MAC address (if it is known by the device).
fid *vlan_id*	(Optional) Displays MAC addresses for a specific filter database identifier.
port *port-string*	(Optional) Displays MAC addresses related to a specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
type	(Optional) Displays information related to specific address type. Valid types are: • **learned** - Shows the network MAC addresses learned by the device. • **self** - Shows the device's own MAC address. • **mgmt** - Shows MAC addresses connected to the management (host) ports.

Command Defaults

If no parameters are specified, all MAC addresses for the device will be displayed.

Command Mode

Read-Only.

Example

This example shows how to display MAC address information:

```
Matrix>show mac
Filter Database Algorithm: mac-vid sequential
Current Filter Database Algorithm: mac-vid sequential
Aging Time : 300 seconds
Dynamic Address Counts : 20    Static Address Counts : 0
------------------------------------------------------------
MAC Address           FID       Port      Type
------------------------------------------------------------
00-01-f4-d2-bc-80      10      host.0.1  self
00-00-1d-b1-16-14      10      fe.0.43   learned
00-00-1d-d4-78-aa      20      ge.2.1    learned
00-00-39-5e-f9-35      10      fe.0.14   learned
00-00-92-94-00-3a      10      fe.0.46   learned
00-00-c8-c8-00-97      20      ge.2.1    learned
00-01-f4-d2-bc-df      2       host.0.1   mgmt
00-01-f4-d2-bc-df      10      host.0.1   mgmt
```


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Table 11-6 provides an explanation of the command output.

Table 11-6 show mac Output Details

Output	What It Displays...
Filter Database Algorithm	Default MAC algorithm mode.
Current Filter Database Algorithm	Current MAC algorithm mode, which is set with the set **mac algorithm** command (Section 11.2.3.15).
Aging Time	Time in seconds to age out inactive MAC address entries. Set with the **set mac agingtime** command (Section 11.2.3.10).
Dynamic Address Counts	Number of dynamic MAC addresses in the routing table.
Static Address Counts	Number of static MAC addresses in the routing table.
MAC Address	MAC address designation.
FID	Filter database identifier associated with the address.
Port	Port designation associated with the address.
Type	Whether or not the address belongs to the device (self), is a **learned** address, or is connected to a management (host) port.

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11.2.3.7 set mac

Use this command to add MAC addresses to the switch IP routing table.

set mac *mac_address vlan_id port-string* {**delete-on-reset** | **delete-on-timeout** | **permanent**}

Syntax Description

mac_address	Specifies the MAC address to set.
vlan_id	Specifies the number identifying the VLAN to which the MAC address belongs.
port-string	Specifies the port designation for the MAC addresses. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
delete-on-reset	Adds a temporary entry to the MAC address table.
delete-on-timeout	Adds a dynamic entry to the MAC address table.
permanent	Adds a permanent entry to the MAC address table.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add a permanent MAC address to the IP routing table:

```
Matrix>set mac 00-a0-c9-0d-32-11 vlan1 fe.0.2 permanent
```


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11.2.3.8 clear mac

Use this command to clear dynamic MAC address information for the switch.

clear mac [**address** *mac_address vlan_id* | **port** *port-string* | **vid** *vlan_id port-string*]

Syntax Description

address *mac_address vlan_id*	(Optional) Removes all dynamic MAC address entries attached to the specified VLAN. If you enter a multicast MAC address and ingress VLAN pair, this command will clear the scoping of this pair to an egress VLAN configured with the **set mac multicast** command **(**Section 11.2.3.24**)**.
port *port-string*	(Optional) Removes all dynamic MAC address entries attached to the specified port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
vid *vlan_id port-string*	(Optional) Removes all dynamic MAC address entries attached to the specified VLAN on the specified port(s).

Command Defaults

If no parameters are specified, all dynamic MAC address entries will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Examples

This example shows how to clear all dynamic MAC address information:

```
Matrix>clear mac
```


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This example clears the scoping of the ingress MAC address 01:00:00:11:11:11 and VLAN 2 pair. Then, the show mac multicast command is executed, to confirm that the scoping has been cleared.

```
Matrix> clear mac address 01-00-00-11-11-11 2
Matrix> show mac multicast
 ---------------------------------------------------------------
 MAC Address            Ingress VLAN   Egress VLAN   Counts :  1
 ---------------------------------------------------------------
 01-00-00-11-11-11           5            3
```

11.2.3.9 show mac agingtime

Use this command to display the current MAC aging time setting.

show mac agingtime

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the MAC aging time. For a detailed description of this output, refer back to Table 11-6:

```
Matrix>show mac agingtime
Filter Database Algorithm: mac-vid sequential
Current Filter Database Algorithm: mac-vid sequential
Aging Time : 300 seconds
Dynamic Address Counts : 5    Static Address Counts : 0
-------------------------------------------------------
MAC Address           FID       Port      Type
-------------------------------------------------------
No Mac address entries available.
```


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11.2.3.10set mac agingtime

Use this command to set the time in seconds to age out inactive MAC address entries.

set mac agingtime *seconds*

Syntax Description

seconds	Specifies the number of seconds for MAC aging time. Valid values are **10** to **630**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the MAC aging time to 400:

```
Matrix>set mac agingtime 400
```

11.2.3.11clear mac agingtime

Use this command to reset the MAC address aging time to the default value of 300 seconds.

clear mac agingtime

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to reset the MAC aging time:

```
Matrix>clear mac agingtime
```

11.2.3.12show port stopaging

Use this command to display the status of the MAC address stop aging function on one or more ports.

show port stopaging [*port-string*]

Syntax Description

port-string	(Optional) Displays status for specified port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status for all ports will be displayed.

Command Type

Switch command.

Command Mode

Read-Only.

Example

This example shows how to display the status of the MAC address stop aging function on Fast Ethernet front panel port 1. In this case, the default status of disabled (addresses are still aging out) has not been changed:

```
Matrix>show port stopaging fe.0.1
 Mac Address Aging
  Port:    Status:
====================
 fe.0.1      Aging
```


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11.2.3.13set port stopaging

Use this command to enable or disable stopping the aging process of MAC address entries on one or more ports. When enabled, this will prevent addresses from aging out due to inactivity on configured ports. Addresses will, however, update properly if moved from port to port.

NOTE: This command must be configured in groups of eight ports for Fast Ethernet ports. Port string variables that are a subset of eight will be rounded up to include all eight ports. For example, if you enable stop aging on ports fe.0.1-4, ports fe.0.1-8 will also be enabled. If you enable it on ports fe.0.4-12, this spans two groups of eight, so groups fe.0.1-8, and fe.0.9-16 will be enabled. The show command will reflect the actual setting. For a detailed description of designating *port-string* values, refer to Section 4.1.2.

set port stopaging *port-string* [**enable** | **disable**]

Syntax Description

port-string	Specifies the port(s) on which to enable or disable the stop aging function. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	(Optional) Enables or disables the stop aging function.

Command Defaults

If **disable** is not specified, stopaging will be enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the stop aging function on Fast Ethernet front panel ports 1 through 8:

```
Matrix>set port stopaging fe.0.1-8
```


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11.2.3.14clear port stopaging

Use this command to reset the stop aging function on one or more ports to the default state of disabled.

clear port stopaging [*port-string*]

Syntax Description

port-string	(Optional) Resets the stop aging function on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, status for all ports will be reset.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the stop aging function to disabled on Fast Ethernet front panel ports 1 through 8:

```
Matrix>clear port stopaging fe.0.1-8
```

11.2.3.15set mac algorithm

Use this command to set the MAC algorithm mode, which determines the hash mechanism used by the device when performing layer 2 lookups on received frames. Each algorithm is optimized for a different spread of MAC addresses.

set mac algorithm {**mac-random** | **mac-sequential** | **mac-vid-random** | **mac-vid-sequential**}

NOTE: The Matrix E1 Series devices cannot support routing interfaces when the MAC algorithm is set to **mac-random** or **mac-sequential**. If you choose either of these modes, the Matrix E1 will display a warning message and prompt you to restart the device.

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Syntax Description

mac-random	Sets the mode to MAC random algorithm, which is best used by networks having a single MAC per VLAN that do not need the VLAN ID to be used in Layer 2 lookups. When running in this mode, the filter database lookup algorithm is optimized for networks with MAC addresses that vary by vendor.
mac-sequential	Sets the mode to MAC sequential algorithm, which is best used by networks having a single MAC per VLAN that do not need the VLAN ID to be used in Layer 2 lookups. When running in this mode the, filter database lookup algorithm is optimized for networks with MAC addresses that very by the non-vendor bytes of the address.
mac-vid-random	Sets the mode to mac-vid-random algorithm, which is best used by networks where a single MAC can be on more than one VLAN and it is necessary for the VLAN ID to be used in the Layer 2 lookup. When running in this mode, the filter database lookup algorithm is optimized for networks with MAC addresses that vary by vendor.
mac-vid-sequential	Sets the mode to mac-vid-sequential algorithm, which is best used by networks where a single MAC can be on more than one VLAN and it is necessary for the VLAN ID to be used in the Layer 2 lookup. When running in this mode the, filter database lookup algorithm is optimized for networks with MAC addresses that very by the non-vendor bytes of the address. This is the device's default setting.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the MAC algorithm mode to mac-vid-sequential:

```
Matrix>set mac algorithm mac-vid-sequential
```

11.2.3.16show dns

Use this command to display DNS (Domain Name Service) settings. DNS translates domain names into IP addresses.

show dns

Syntax Description

None.

Command Defaults

None.

Command Mode

Read-Only.

Example

This example shows how to display DNS settings. In this case, DNS is enabled, using three servers and a domain name of “net.com”:

```
Matrix>show dns
DNS status: configured
DNS domain: net.com

DNS Servers
------------------
131.141.92.38
131.141.92.39
131.141.92.30
```

11.2.3.17set dns domain

Use this command to set the DNS domain name.

set dns domain *domain-name*

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Syntax Description

domain-name	Specifies a DNS domain name.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the DNS domain name to “net.com”:

```
Matrix>set dns domain net.com
```

11.2.3.18clear dns domain

Use this command to clear the DNS domain name.

clear dns domain

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear the DNS domain name:

```
Matrix>clear dns domain
```


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11.2.3.19set dns server

Use this command to add a server to the DNS server list.

set dns server *ip-address*

Syntax Description

ip-address	Specifies an IP address of a DNS server.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to add the server at IP address 134.141.92.37 to the DNS server list:

```
Matrix>set dns server 134.141.92.37
```

11.2.3.20clear dns server

Use this command to remove a server from the DNS server list.

set dns server *ip-address*

Syntax Description

ip-address	Specifies an IP address of a DNS server.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to remove the server at IP address 134.141.92.37 from the DNS server list:

```
Matrix>set dns server 134.141.92.37
```

11.2.3.21clear dns

Use this command to clear all DNS information.

clear dns

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all DNS information:

```
Matrix>clear dns
```


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11.2.3.22ping

Use this command to send ICMP echo-request packets to another node on the network while operating in switch mode.

ping {[[**-s**] *hostname* | *ip_address*] [*hostname* | *ip_address* [*packet-count*]]}

Syntax Description

-s	(Optional) Causes a continuous ping, sending one datagram per second and printing one line of output for every response received, until the user enters Ctrl+C.
hostname | *ip_address*	Specifies a host name or an IP address of the device to which the **ping** will be sent.
packet-count	(Optional) Specifies the number of packets to send. Valid values are from **1** to **2147483647**.

Command Defaults

If not specified, *packet-count* will be 3.

Command Type

Switch command.

Command Mode

Read-Only, Read-Write or Admin (su).

Examples

This example shows how to ping IP address 10.1.10.1:

```
Matrix>ping 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1

 ------ PING 10.1.10.1: Statistics ------
 3 packets transmitted, 3 packets received, 0% packet loss
```


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This example shows how to ping IP address 10.1.10.1 with 10 packets:

```
Matrix>ping 10.1.10.1 10
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1

 ------ PING 10.1.10.1: Statistics ------
 10 packets transmitted, 10 packets received, 0% packet loss
```

This example shows a continuous ping of IP address 10.1.10.1. In this case, entering Ctrl+C after 9 iterations caused command execution to stop:

```
Matrix>ping -s 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1
 Reply from 10.1.10.1

 PING 10.1.10.1: Statistics
 9 packets transmitted, 9 packets received, 0% packet loss
```


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11.2.3.23traceroute

Use this command to display a hop-by-hop path through an IP network from the device to a specific destination host when operating in switch mode. Three UDP or ICMP probes will be transmitted for each hop between the source and the traceroute destination.

traceroute [**-w** *waittime*] [**-f** *first-ttl*] [**-m** *max-ttl*] [**-p** *port*] [**-q** *nqueries*] [**-s** *src-addr*] [**-r**] [**-d**] [**-t** *tos*] [**-F**] [**-g** *gateway*] [**-I**] [**-n**] [**-v**] [**-x**] *host* [*packetlen*]

Syntax Description

-w *waittime*	(Optional) Specifies time in seconds to wait for a response to a probe.
-f *first-ttl*	(Optional) Specifies the time to live (TTL) of the first outgoing probe packet.
-m *max-ttl*	(Optional) Specifies the maximum time to live (TTL) used in outgoing probe packets.
-p *port*	(Optional) Specifies the base UDP port number used in probes.
-q *nqueries*	(Optional) Specifies the number of probe inquiries.
-s *src-addr*	(Optional?) Specifies the source IP address to use in outgoing probe packets.
-r	(Optional) Bypasses the normal host routing tables.
-d	(Optional) Sets the debug socket option.
-t *tos*	(Optional) Sets the type of service (TOS) to be used in probe packets.
-F	(Optional) Sets the ‘don’t fragment’ bit.
-g *gateway*	(Optional) Specifies a loose source gateway (up to 8 can be specified), or specifies a specific gateway, such as **gw1**.
-I	(Optional) Specifies the use of ICMP echo requests rather than UDP datagrams.
-n	(Optional) Displays hop addresses numerically. (Supported in a future release.)
-v	(Optional) Displays verbose output, including the size and destination of each response.

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-x	(Optional) Prevents traceroute from calculating checksums.
host	Specifies the host to which the route of an IP packet will be traced.
packetlen	(Optional) Specifies the length of the probe packet.

Command Defaults

- If not specified, *waittime* will be set to **5** seconds.
- If not specified, *first-ttl* will be set to **1** second.
- If not specified, *max-ttl* will be set to **30** seconds.
- If not specified, *port* will be set to **33434**.
- If not specified, *nqueries* will be set to **3**.
- If **-r** is not specified, normal host routing tables will be used.
- If **-d** is not specified, the debug socket option will not be used.
- If not specified, *tos* will be set to **0**.
- If **-F** is not specified, the ‘don’t fragment’ bit will not be applied.
- If *gateway* is not specified, none will be applied.
- If **-I** is not specified, UDP datagrams will be used.
- If **-v** is not specified, summary output will be displayed.
- If **-x** is not specified, checksums will be calculated.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to use traceroute to display a round trip path to host 192.167.252.17. In this case, hop 1 is the Matrix E1 switch, hop 2 is 14.1.0.45, and hop 3 is back to the host IP address. Round trip times for each of the three UDP probes are displayed next to each hop:

```
Matrix>traceroute 192.167.252.17
traceroute to 192.167.252.17 (192.167.252.17), 30 hops max, 40 byte packets
  1  matrix.enterasys.com (192.167.201.40)  20.000 ms  20.000 ms  20.000 ms
  2  14.1.0.45 (14.1.0.45)  40.000 ms  10.000 ms  20.000 ms
  3  192.167.252.17 (192.167.252.17)  50.000 ms  0.000 ms  20.000 ms
```

11.2.3.24set mac multicast

Use this command to configure a “scoping” egress VLAN that can be assigned to an ingress multicast MAC – VLAN pair. A maximum of 32 ingress MAC address – VLAN pairs may be configured.

set mac multicast *mac_address ingress_vlanid egress_vlanid*

Syntax Description

mac_address	Specifies the ingress MAC address of the MAC address – VLAN pair to scope to the specified egress VLAN.
ingress_vlanid	Specifies the number identifying the ingress VLAN of the MAC address – VLAN pair to scope to the specified egress VLAN.
egress_vlanid	Specifies the number identifying the egress VLAN.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Usage

To allow certain load-balancing servers to function correctly, frames with a pre-defined multicast address are flooded and received by all load-balancing servers. These servers are preconfigured to decide who responds to these requests. The problem with this approach is that the multicast frames are flooded to all ports that are members of the VLAN that the frame was received on.

This command allows you to configure a “scoping” VLAN that can be assigned to an ingress multicast MAC – VLAN pair. That egress VLAN will then be used to limit the number of ports out of which the multicast frames are flooded.

You may assign the same multicast MAC address with different ingress VLANs to the same or different egress VLANs. You may also assign several different ingress MAC address – VLAN pairs to the same egress VLAN.

To set up a scoping VLAN:

1. Determine which ports the multicast servers are attached to.
2. Create a “scoping” VLAN which egresses only those ports.
3. Assign an ingress multicast MAC address – VLAN pair to point to this newly created egress VLAN with the **set mac multicast** command.

To delete a scoping VLAN from a MAC address – VLAN pair, use the **clear mac** command (Section 11.2.3.8).

NOTES: This solution will work in Layer 2 (Switching) mode. Operation is undefined if this configuration is attempted with routing enabled on the device.

Traffic will be dropped if the egress VLAN is not configured.

A maximum of 32 ingress MAC address – VLAN pairs may be configured.

Examples

This example scopes the multicast MAC address 01:00:00:11:11:11 that is associated with VLAN 2 to egress the ports that have VLAN 3 egress enabled. This example assumes that VLAN 3 has already been configured.

```
Matrix> set mac multicast 01-00-00-11-11-11 2 3
```


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This example sets a second MAC address – VLAN pair to egress on the same VLAN 3 ports. The same multicast MAC address, 01:00:00:11:11:11, is used, but it is associated with VLAN 5 in this example:

```
Matrix> set mac multicast 01-00-00-11-11-11 5 3
```

This example deletes a scoping VLAN from a configured ingress MAC address – VLAN pair:

```
Matrix> clear mac address 01-00-00-11-11-11 5
```

11.2.3.25show mac multicast

Use this command to display information about all configured scoped ingress MAC address – VLAN pairs.

show mac multicast

Syntax Description

None.

Command Defaults

None.

Command Mode

Switch command.

Command Mode

Read-Only.

Example

This example shows the output of this command:

```
Matrix> show mac multicast
 ------------------------------------------------------------------
 MAC Address            Ingress VLAN   Egress VLAN   Counts :  2
 ------------------------------------------------------------------
 01-00-00-11-11-11           2            3
 01-00-00-11-11-11           5            3
```


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11.2.4 Configuring Simple Network Time Protocol (SNTP)

Purpose

To configure the Simple Network Time Protocol (SNTP), which synchronizes device clocks in a network. For other time-related commands, see Section 3.2.2, "Setting Basic Device Properties," on page 3-30.

Commands

Commands to configure SNTP are listed below and described in the associated section as shown.

- show sntp (Section 11.2.4.1)
- set sntp client (Section 11.2.4.2)
- set sntp broadcastdelay (Section 11.2.4.3)
- set sntp poll-interval (Section 11.2.4.4)
- set sntp server (Section 11.2.4.5)
- clear sntp server (Section 11.2.4.6)
- set timezone (Section 11.2.4.7)
- clear timezone (Section 11.2.4.8)

11.2.4.1 show sntp

Use this command to display SNTP settings.

show sntp

Syntax Description

None.

Command Defaults

None.

Command Mode

Read-Only.

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Example

This example shows how to display SNTP settings. In this case, SNTP is operating in unicast mode. Broadcast delay is set at the default of 3000 milliseconds and SNTP requests are being transmitted every 512 seconds. Two servers, one with IP address 10.21.1.100, and another with host name "roadking" are configured as SNTP servers:

```
Matrix>show sntp

SNTP Version: 3
Current Time: Thursday April 3, 2003 09:42:54
Timezone: 'EST', offset from UTC is -5 hours and 0 minutes
Last SNTP update: Wednesday April 2, 2003 11:02:48
Client mode: broadcast
Broadcast delay: 3000
Poll Interval: 512
SNTP Requests: 10
Last SNTP Request: Thursday, April 3, 2003 09:32:54

 SNTP- Servers
------------------
10.21.1.100
roadking
```

11.2.4.2 set sntp client

Use this command to set the SNTP operation mode.

set sntp client {**broadcast** | **unicast** | **disable**}

Syntax Description

broadcast	Enables SNTP in broadcast client mode.
unicast	Enables SNTP in unicast (point-to-point) client mode. In this mode, the client must supply the IP address from which to retrieve the current time.
disable	Disables SNTP.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to enable SNTP in broadcast mode:

```
Matrix>set sntp broadcast
```

11.2.4.3 set sntp broadcastdelay

Use this command to set the SNTP time to wait for a response from an SNTP server, in milliseconds, when in broadcast mode.

set sntp broadcastdelay *time*

Syntax Description

time	Specifies broadcast delay time in milliseconds. Valid values are **1** to **999999**. Default value is **3000**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the SNTP broadcast delay to 12000 milliseconds:

```
Matrix>set sntp broadcastdelay 12000
```

11.2.4.4 set sntp poll-interval

Use this command to set the SNTP poll interval in seconds. This is the time between SNTP requests when operation in broadcast or unicast mode.

set sntp poll-interval *interval*

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Syntax Description

interval	Specifies the poll interval in seconds. Valid values are **16** to **16284**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the SNTP poll interval to 30 seconds:

```
Matrix>set sntp poll-interval 30
```

11.2.4.5 set sntp server

Use this command to add a server from which the SNTP client will retrieve the current time when operating in unicast mode. Up to 10 servers can be set as SNTP servers.

set sntp server {*ip-address* | *hostname*}

Syntax Description

ip-address | *hostname*	Specifies the SNTP server's IP address or host name.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the server at IP address 10.21.1.100 as an SNTP server:

```
Matrix>set sntp server 10.21.1.100
```

11.2.4.6 clear sntp server

Use this command to remove one or all servers from the SNTP server list.

clear sntp server {**all** [*ip-address* | *hostname*]}

Syntax Description

all	Removes all servers from the SNTP server list.
ip-address | *hostname*	Specifies the IP address or host name of a server to remove from the SNTP server list.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove the server at IP address 10.21.1.100 from SNTP server list:

```
Matrix>clear sntp server 10.21.1.100
```


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11.2.4.7 set timezone

Use this command to set the SNTP time zone name and hours and minutes it is offset from Coordinated Universal Time (UTC).

set timezone *name* [*hours*] [*minutes*]

Syntax Description

name	Specifies the time zone name.
hours	(Optional) Specifies the number of hours this timezone will be offset from UTC. Valid values are minus 13 (**-13**) to **14**.
minutes	(Optional) Specifies the number of minutes this timezone will be offset from UTC. Valid values are **0** to **59**.

Command Defaults

If offset *hours* or *minutes* are not specified, none will be applied.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the time zone to EST with an offset of minus 5 hours:

```
Matrix>set timezone ETS -5 0
```

11.2.4.8 clear timezone

Use this command to remove SNTP time zone adjustment values.

clear timezone

Syntax Description

None.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove SNTP time zone adjustment values:

```
Matrix>clear timezone
```


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11.2.5 Configuring Node Aliases

Purpose

To review, configure, disable and re-enable node (port) alias functionality, which determines what network protocols are running on one or more ports.

Commands

Commands to configure node aliases are listed below and described in the associated section as shown.

- show nodealias (Section 11.2.5.1)
- show nodealias config (Section 11.2.5.2)
- set nodealias (Section 11.2.5.3)
- set nodealias maxentries (Section 11.2.5.4)
- clear nodealias (Section 11.2.5.5)
- clear nodealias config (Section 11.2.5.6)

11.2.5.1 show nodealias

Use this command to display node alias properties on one or more ports.

show nodealias [*port-string*]

Syntax Description

port-string	(Optional) Displays node alias properties for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, node alias properties will be displayed for all ports.

Command Mode

Read-Only.

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Example

This example (a portion of the command output) shows how to display node alias properties for all ports:

```
Matrix>show nodealias
 Alias ID     = 24117248          Active      = true
 Interface    = ge.0.6            Time        = 0  days 00:02:52
 Vlan ID      = 1                 MAC Address = 00-e0-63-26-ea-c9
 Protocol     = bootpc(8)         Address     =
 Address Text =

 Alias ID     = 17301504          Active      = true
 Interface    = ge.0.6            Time        = 0  days 00:04:52
 Vlan ID      = 1                 MAC Address = 00-01-f4-9e-54-cd
 Protocol     = ip(1)             Address     = 0a 02 f0 01
 Address Text = 10.2.240.1
```

Table 11-7 provides an explanation of the command output.

Table 11-7 show nodealias Output Details

Output	What It Displays...
Alias ID	Alias dynamically assigned to this port. **NOTE:** Node aliases are dynamically assigned upon packet reception to ports enabled with an alias agent, which is the default setting on Matrix E1 Series devices. Node aliases cannot be statically created, but can be deleted using the **clear node alias** command (Section 11.2.5.5).
Active	Whether or not this node alias entry is active.
Interface	Port designation.
Time	Time this since this entry was created.
Vlan ID	VLAN ID associated with this alias.
MAC Address	MAC address associated with this alias.
Protocol	Networking protocol running on this port.
Address / Address Text	When applicable, a protocol-specific address associated with this alias.

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11.2.5.2 show nodealias config

Use this command to display node alias configuration settings on one or more ports.

show nodealias config [*port-string*]

Syntax Description

port-string	(Optional) Displays node alias configuration settings for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, node alias configurations will be displayed for all ports.

Command Mode

Read-Only.

Example

This example shows how to display node alias configuration settings for all Gigabit Ethernet ports:

```
Matrix>show nodealias config ge.*.*

Total Control Entries = 11                  Active Entries    = 11
Purge Time            = 0  days 00:00:00    State             = Ready
Allocated Entries     = 4092                Available Entries = 4

Port Number    Max Entries    Used Entries    Status
-----------    -----------    ------------    --------
ge.0.1                 682               0    Enabled
ge.0.2                 682               0    Enabled
ge.0.3                 682               0    Enabled
ge.0.4                 682               0    Enabled
ge.0.5                 682               0    Enabled
ge.0.6                 682              11    Enabled
```

Table 11-8 provides an explanation of the command output.

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Table 11-8 show nodealias config Output Details

Output	What It Displays...
Total Control Entries	Total aliases learned.
Active Entries	Number of Total Control Entries that are active (not marked for deletion).
Purge Time	Last time the node alias table was cleared.
State	Node alias is ready to learn new entries.
Allocated Entries	Number of entries that have been allocated to all the ports. This is the total of the Max Entries column.
Available Entries	Maximum node alias buffers available.
Port Number	Port designation.
Max Entries	Maximum number of alias entries configured for this port. Set using the **set nodealias maxentries** command (Section 11.2.5.4).
Used Entries	Number of alias entries (out of the maximum amount configured) already used by this port.
Status	Whether or not a node alias agent is enabled (default) or disabled on this port.

11.2.5.3 set nodealias

Use this command to enable or disable a node alias agent on one or more ports. Upon packet reception, node aliases are dynamically assigned to ports enabled with an alias agent, which is the default setting on Matrix E1 Series devices. Node aliases cannot be statically created, but can be deleted using the clear node alias command as described in Section 11.2.5.5.

set nodealias {**enable** | **disable**} *port-string*

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Syntax Description

enable | **disable**	Enables or disables a node alias agent.
port-string	Specifies the port(s) on which to enable or disable a node alias agent. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to disable the node alias agent on Fast Ethernet front panel port 3:

```
Matrix>set nodealias disable fe.0.3
```

11.2.5.4 set nodealias maxentries

Use this command to set the maximum number of node alias entries allowed for one or more ports.

set nodealias maxentries *val port-string*

Syntax Description

val	Specifies the maximum number of alias entries. Valid values are **1 - 4096**.
port-string	Specifies the port(s) on which to set the maximum entry value. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the maximum node alias entries to 1000 on Fast Ethernet front panel port 3:

```
Matrix>set nodealias maxentries 1000 fe.0.3
```

11.2.5.5 clear nodealias

Use this command to remove one or more node alias entries.

clear nodealias {**port** *port-string* | **alias-id** *alias-id*}

Syntax Description

port *port-string*	Specifies the port(s) on which to remove all node alias entries. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
alias-id *alias-id*	Specifies the ID of the node alias to remove. This value can be viewed using the **show nodealias** command as described in Section 11.2.5.1.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all node alias entries on Fast Ethernet front panel port 3:

```
Matrix>clear nodealias port fe.0.3
```


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11.2.5.6 clear nodealias config

Use this command to reset node alias state to enabled and clear the maximum entries value.

clear nodealias config

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the node alias configuration:

```
Matrix>clear nodealias config
```


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11.2.6 Configuring Convergence End Points (CEP) Phone Detection

About CEP Phone Detection

Convergence is a way to detect a remote IP telephony or video device and apply a policy to the connection port based on the type of CEP device found. When a convergence end point (CEP) is found, the global policy for that CEP is applied to that port. The following phone detection types are available on the Matrix E1 device:

- Cisco Phone Detection – Uses the Cisco Discovery Protocol (CiscoDP) to detect IP phones. When Cisco phone detection is enabled using the commands described in this section, CiscoDP is turned on automatically and will override any administrative settings set by CiscoDP. For more information on configuring CiscoDP, refer to Section 3.2.6.
- Siemens or Hipath Phone Detection – Uses either an IP address or a UDP / TCP port number for detection. By default UDP port 4060 will be used and there is no IP address configured. The commands in this section can be used to configure Siemens detection using new parameters.
- H.323 Phone Detection – Uses either a group IP address or a UDP / TCP port number for detection. Default UDP ports are 1718,1719,1720. Default group address is 224.0.1.41. The commands in this section can be used to configure H.323 detection using new parameters.

NOTES: Convergence will not work with Port Web Authentication (PWA) enabled.

Convergence will work with MAC authentication or 802.1x enabled. When an 802.1x policy is applied to a port, that policy will take precedence over a convergence policy. For information on checking and changing the status of these authentication protocols, refer to Chapter 14.

There is no way to detect if a Siemens or H.323 phone goes away other than a link down. Therefore, if these types of phones are not directly connected to the switch's port and the phone goes away, the switch will still think there is a phone connection and any configured policy will remain on the port.

Purpose

To review, set the status and configure CEP phone detection.

Commands

Commands to configure CEP phone detection are listed below and described in the associated section as shown.

- show cep (Section 11.2.6.1)

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- set cep (Section 11.2.6.2)
- set cep port (Section 11.2.6.3)
- set cep policy (Section 11.2.6.4)
- set cep detection (Section 11.2.6.5)
- set cep detection type (Section 11.2.6.6)
- set cep detection address (Section 11.2.6.7)
- set cep detection protocol (Section 11.2.6.8)
- set cep detection porthigh (Section 11.2.6.9)
- set cep initialize (Section 11.2.6.10)
- clear cep (Section 11.2.6.11)

11.2.6.1 show cep

Use this command to display CEP phone detection settings.

show cep [**connections**] [**detection**] [**policy**] [[**port**] [*port-string*]]

Syntax Description

connections	(Optional) Displays CEP connections.
detection	(Optional) Displays all discovery parameters being used for CEP detection.
policy	(Optional) Displays the global CEP policy per protocol.
port *port-string*	(Optional) Displays CEP status for one or more ports. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If no parameters are specified, all CEP settings will be displayed for all ports.

Command Mode

Read-Only.

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Examples

This example shows how to display CEP status for each detection type on port ge.0.1. In this case the default state of disabled for each type has not been changed:

```
Matrix>show cep port ge.0.1
CEP Detection:           - disabled
ge.0.1
         H323 phone      - disabled
         Siemens phone   - disabled
         Cisco phone     - disabled
```

This example shows default CEP policy information. In this case, no policies have been configured for the three CEP detection types:

```
Matrix>show cep policy
CEP default policies
   CEP Type  Policy Index  Policy Name
   --------  ------------  ------------
   H323
   Siemens
   Cisco
```

11.2.6.2 set cep

Use this command to globally enable or disable CEP detection.

set cep {**enable** | **disable**}

Syntax Description

enable | **disable**	Globally enables or disables CEP detection.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to globally enable CEP detection:

```
Matrix>set cep enable
```

11.2.6.3 set cep port

Use this command to enable or disable a CEP detection type on one or more ports.

set cep port *port-string* {**cisco** | **h323** | **siemens**} {**enable** | **disable**}

Syntax Description

port-string	Specifies the port(s) to enable or disable. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
cisco | **h323** | **siemens**	Specifies the CEP detection that will be applied as Cisco, H.323 or Siemens phone detection.
enable | **disable**	Enables or disables CEP detection as specified.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable Cisco phone detection on port fe. 3. 1:

```
Matrix>set cep port fe.3.1 cisco enable
```

11.2.6.4 set cep policy

Use this command to set a global default policy for a CEP detection type. This is the policy that will be applied when a phone of the specified type is detected on a port. It must be configured using the policy management commands described in Chapter 11.

set cep policy {**cisco** | **h323** | **siemens**} *profile-id*

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Syntax Description

cisco | **h323** | **siemens**	Specifies the default policy as Cisco, H.323 or Siemens phone detection.
profile-id	Specifies an ID for this CEP policy profile. This must be configured using the policy management commands described in Chapter 11. Valid values are **1** - **65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign policy profile 1 to all H.323 phones detected:

```
Matrix>set cep policy h323 1
```

11.2.6.5 set cep detection

Use this command to create a new H.323 or Siemens phone detection configuration group, or enable, disable or remove an existing group.

set cep detection *detection-id* {**create** | **delete** | **disable** | **enable**}

NOTE: This command applies only to Siemens and H.323 phone detection. Cisco detection uses CiscoDP as its discovery method.

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Syntax Description

detection-id	Specifies a CEP discovery group ID. Valid values are **1** - **2147483647**.
create | delete | disable | enable	Creates a new convergence end points detection configuration group, or removes, disables or enables an existing group. A group must first be created then enabled to become operational.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to create CEP detection group 1:

```
Matrix>set cep detection 1 create
```

11.2.6.6 set cep detection type

Use this command to specify whether a phone detection group will use H.323 or Siemens as its phone discovery type.

set cep detection *detection-id* **type** {**h323** | **siemens**}

NOTE: This command applies only to Siemens and H.323 phone detection. Cisco detection uses CiscoDP as its discovery method.

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Syntax Description

detection-id	Specifies a CEP discovery group ID. This group must be created and enabled using the **set cep detection** command as described in Section 11.2.6.5. Valid values are **1** - **2147483647**.
h323 | **siemens**	Specifies the phone type to detect as H.323 or Siemens.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the phone detection type to H.323 for CEP group 1:

```
Matrix>set cep detection 1 type h323
```

11.2.6.7 set cep detection address

Use this command to set an H.323 or Siemens phone detection group's IP address or mask. By default, H.323 will use 224.0.1.41 as its IP address and Siemens will have no IP address configured.

set cep detection *detection-id* {[**address** {**ipv4** *ip-address* | **unknown**}] [**mask** {**ipv4** *mask* | **unknown**}]}

NOTE: This command applies only to Siemens and H.323 phone detection. Cisco detection uses CiscoDP as its discovery method.

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Syntax Description

detection-id	Specifies a CEP discovery group ID. This group must be created and enabled using the **set cep detection** command as described in Section 11.2.6.5. Valid values are **1** - **2147483647**.
address	Sets an IP address for the CEP discovery group.
ipv4 *ip-address* | **unknown**	Specifies an IPv4 address or an address of an unknown IP protocol type.
mask	Sets an address mask for the CEP discovery group.
ipv4 *mask* | **unknown**	Specifies an IPv4 address mask or an address mask of an unknown IP protocol type.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set an IP address of 10.1.1.3 for detection group 1:

```
Matrix>set cep detection 1 address ipv4 10.1.1.3
```

11.2.6.8 set cep detection protocol

Use this command to specify an IP protocol type for H.323 or Siemens convergence end points detection. If an IP address is not set for a phone detection group as described in Section 11.2.6.7, this will configure detection on UDP and/or TCP ports using a port range defined with the **set cep detection porthigh** | **portlow** command as described in Section 11.2.6.9.

set cep detection *detection-id* **protocol** {**tcp** | **udp** | **both** | **none**}

NOTE: This command applies only to Siemens and H.323 phone detection. Cisco detection uses CiscoDP as its discovery method.

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Syntax Description

detection-id	Specifies a CEP discovery group ID. This group must be created and enabled using the **set cep detection** command as described in Section 11.2.6.5. Valid values are **1** - **2147483647**.
tcp | **udp** | **both** | **none**	Sets the CEP IP protocol type as: • TCP • UDP • Both UDP and TCP • None

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable both TCP and UDP convergence end points detection for CEP detection group 1:

```
Matrix>set cep detection 1 protocol both
```

11.2.6.9 set cep detection porthigh

Use this command to set the maximum and minimum ports used for TCP or UDP convergence end points detection. Once UDP and/or TCP phone detection has been specified using the **set cep detection protocol** command as described in Section 11.2.6.8, the protocols will use this port range for detection matching.

set cep detection *detection-id* {**porthigh** | **portlow** *port*}

NOTE: This command applies only to Siemens and H.323 phone detection. Cisco detection uses CiscoDP as its discovery method.

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Syntax Description

detection-id	Specifies a CEP discovery group ID. This group must be created and enabled using the **set cep detection** command as described in Section 11.2.6.5. Valid values are **1** - **2147483647**.
porthigh | **portlow** *port*	Specifies a maximum or minimum UDP or TCP port to be used for convergence end points detection.Valid values are **1 - 65535**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set port 65 as the minimum port to be used for convergence end points detection for CEP group 1:

```
Matrix>set cep detection portlow 65
```

11.2.6.10set cep initialize

Use this command to re-initialize convergence end points detection on one or more CEP-enabled ports.

set cep initialize *port-string*

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Syntax Description

port-string	Specifies the CEP-enabled port(s) to re-initialize. This must be a *port-string* enabled for CEP using the **set cep port** command as described in Section 11.2.6.3. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to re-initialize CEP ports fe.1.3-5:

```
Matrix>set cep initialize fe.1.3-5
```

11.2.6.11clear cep

Use this command to clear convergence end points parameters.

clear cep {[**all** | **policy** | **detection**] [**port** *port-string* {**all** | **cisco** | **h323** | **siemens**}]}

Syntax Description

all | **policy** | **detection**	Clears all CEP parameters, or specifies that policy or detection parameters will be cleared.
port *port-string* **cisco** | **h323** | **siemens**	Resets the CEP default enable state to disabled on specific port(s) for Cisco, H.323 or Siemens phone detection. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear all CEP policy parameters

```
Matrix>clear cep policy
```


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12

IP Configuration

This chapter describes the Internet Protocol (IP) configuration set of commands and how to use them.

ROUTER: The commands covered in this chapter can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

12.1 PROCESS OVERVIEW: INTERNET PROTOCOL (IP) CONFIGURATION

Use the following steps as a guide to configuring IP on the device:

1. Configuring routing interface settings (Section 12.2.3)
2. Reviewing and saving the routing configuration (Section 12.2.2)
3. Reviewing and configuring the ARP table (Section 12.2.3)
4. Reviewing and configuring broadcast settings (Section 12.2.4)
5. Reviewing IP traffic and configuring routes (Section 12.2.5)

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12.2 IP CONFIGURATION COMMAND SET

12.2.1 Configuring Routing Interface Settings

Basic Routing Interface Properties

The Matrix E1 firmware supports the following routing interface properties:

- Maximum number of (VLAN) routing interfaces: 256
- Maximum number of loopback interfaces: 20
- Maximum number of IP helper addresses per interface: 20
- Maximum number of IP addresses per interface: 1 primary, 8 secondary

About Loopback vs. VLAN Interfaces

Loopback interfaces are different from VLAN routing interfaces because they allow you to disconnect the operation of routing protocols from network hardware operation, improving the reliability of IP connections. A loopback interface is always reachable. The IP address assigned to the loopback interface is used as the router ID, which helps when running protocols like OSPF, because OSPF can be running even when the outbound interface is down. IP packets routed to the loopback interface are rerouted back to the router or access server and processed locally.

Routing interface configuration commands in this guide will configure either a VLAN or loopback interface, depending on your choice of parameters, as shown in Table 12-1.

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Table 12-1 VLAN and Loopback Interface Configuration Modes

For Routing Interface Type...	Enter (in Global Configuration Mode)...	Resulting Prompt...
VLAN	**vlan** *vlan-id*	**Matrix>Router(config-if(Vlan 1))#**
Loopback	**loopback** *loopback-id*	**Matrix>Router(config-if (Lpbk 1))#**

For details on how to enable all router CLI configuration modes, refer back to Table 3-10.

For details on configuring routing protocols, refer to Chapter 13.

NOTE: The command prompts used in examples throughout this guide show a system where VLAN 1 has been configured for routing. The prompt changes depending on your current configuration mode, and the interface types and numbers configured for routing on your system.

Purpose

To enable routing interface configuration mode on the device, to create VLAN or loopback routing interfaces, to review the usability status of interfaces configured for IP, to set IP addresses for interfaces, and to enable interfaces for IP routing at device startup.

Commands

The commands needed to review and configure interface settings are listed below and described in the associated section as shown:

- show interface
- interface (Section 12.2.1.2)
- show ip interface (Section 12.2.1.3)
- ip address (Section 12.2.1.4)
- no shutdown (Section 12.2.1.5)

12.2.1.1 show interface

Use this command to display information about all interfaces (VLANs or loopbacks) configured on the router.

show interface [**vlan** *vlan-id* | **loopback** *loopback-id*]

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Syntax Description

vlan *vlan-id* | **loopback** *loopback-id*	(Optional) Displays interface information for a specific VLAN or loopback. This interface must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If not specified, information for all interfaces will be displayed.

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Example

This example shows how to display information for all interfaces configured on the router:

```
Matrix>Router#show interface
Vlan 1 is  Administratively UP
 Vlan 1 is  Operationally UP
 Internet Address  is 10.1.1.1, Subnet  Mask is 255.0.0.0
 Internet Address  is 11.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 12.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 13.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 14.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 15.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 16.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 17.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Internet Address  is 18.1.1.1, Subnet  Mask is 255.0.0.0 Secondary
 Mac Address is: 0001.f4c1.6b1f
 The name of this device is  Vlan   1
 Ports in Vlan: fe.0.1-46,fe.1.1-16, ge.2.1-2, ge.3.1-2
 The MTU is 1500 bytes
 The bandwidth is 10000 Mb/s
 Encapsulation ARPA, Loopback not set
 ARP type: ARPA, ARP Timeout: 14400 seconds

Vlan 47 is  Administratively UP
 Vlan 47 is  Operationally DOWN
 Internet Address  is 47.1.1.1, Subnet  Mask is 255.0.0.0
 Mac Address is: 0001.f4c1.6b1f
 The name of this device is  Vlan   47
 Ports in Vlan: fe.0.47
 The MTU is 1500 bytes
 The bandwidth is 10000 Mb/s
 Encapsulation ARPA, Loopback not set
 ARP type: ARPA, ARP Timeout: 14400 seconds
```


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12.2.1.2 interface

Use this command to enable interface configuration mode from global configuration mode. For details on configuration modes supported by the Matrix E1 device and their uses, refer to Table 3-10 in Section 3.3.3.

interface vlan *vlan_id* | **loopback** *loopback-id*

NOTES: VLANs must be created in switch mode before they can be configured for IP routing. For details on creating VLANs and configuring them for IP, refer to Section 3.3.2.

Each VLAN or loopback interface must be configured for routing separately using the **interface** command. To end configuration on one VLAN before configuring another, type **exit** at the command prompt. Enabling interface configuration mode is required for completing interface-specific configuration tasks. For an example of how these commands are used, refer to Figure 3-7 in Section 3.3.2.

Syntax Description

vlan *vlan_id* | **loopback** *loopback-id*	Specifies the VLAN or loopback interface to be configured for routing. This interface must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Global configuration mode: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to enter configuration mode for VLAN 1:

```
Matrix>Router#configure terminal
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#
```


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12.2.1.3 show ip interface

Use this command to display information, including administrative status, IP address, name, MTU size and bandwidth, for interfaces configured for IP.

show ip interface [**vlan** *vlan_id* | **loopback** *loopback-id*]

Syntax Description

vlan *vlan_id* | **loopback** *loopback-id*	(Optional) Displays interface information for a specific VLAN or loopback. This interface must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If not specified, status information for all interfaces will be displayed.

Example

This example shows how to display configuration information for all VLANs configured for IP routing:

```
Matrix>Router#show ip interface
Vlan 1 is  Admin UP
Internet Address is 182.127.63.1, Subnet  Mask is 255.255.255.0
The name of this device is  Vlan
The MTU is 1500 bytes
The bandwidth is 10000

Vlan 2 is  Admin UP
Internet Address  is 182.127.62.1, Subnet  Mask is 255.255.255.0
The name of this device is  Vlan
The MTU is 1500 bytes
The bandwidth is 10000
```


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12.2.1.4 ip address

Use this command to set, remove, or disable a primary or secondary IP address for an interface.

ip address *ip_address ip_mask*

Syntax Description

ip_address	Specifies the IP address of the interface to be added or removed.
ip_mask	Specifies the mask for the associated IP subnet.

Command Syntax of the "no" Form

The "no" form of this command removes the specified IP address and disables the interface for IP processing.

no ip address *ip_address ip_mask*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

The following example sets the IP address to 192.168.1.1 and the network mask to 255.255.255.0 for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip address 192.168.1.1 255.255.255.0
```

12.2.1.5 no shutdown

Use this command to enable an interface for IP routing and to allow the interface to automatically be enabled at device startup.

no shutdown

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Syntax Description

None.

NOTE: The **shutdown** form of this command disables an interface for IP routing.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

The following example shows how to enable VLAN 1 for IP routing:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#no shutdown
```

12.2.2 Reviewing and Saving the Routing Configuration

Purpose

To review and save the current routing configuration, and to disable IP routing.

Commands

The commands needed to review and save the routing configuration are listed below and described in the associated section as shown:

- show running-config (Section 12.2.2.1)
- write (Section 12.2.2.2)
- no ip routing (Section 12.2.2.3)

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12.2.2.1 show running-config

Use this command to display the current non-default router operating configuration.

show running-config

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

Example

This example shows how to display the current router operating configuration:

```
Matrix>Router#show running-config

!
 Router id 182.127.62.1
!
 interface vlan  1
  IP Address 182.127.63.1 255.255.255.0
  no shutdown
 interface vlan  2
  IP Address 182.127.62.1 255.255.255.0
  no shutdown
!
 router rip
  network 182.127.0.0
!
```

Table 12-2 provides an explanation of the command output.

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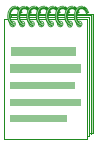
Table 12-2 show running-config Output Details

Output	What It Displays...
Router id	Router ID (IP address) used by the OSPF protocol for path selection. Unless configured by using the **router id** command as described in Section 13.1.2.3, this will default to the lowest IP address of interfaces configured for routing on the device.
interface vlan	VLANs configured for IP routing and their IP addresses. At least two VLAN interfaces must be configured for IP routing to operate the device in router mode. For details on how to do this, refer to Section 3.3.2.
router rip	RIP routing protocol is enabled, For details on configuring RIP, refer to Section 13.1.1.
network	IP address of a directly connected network that RIP will advertise to its neighboring routers. For details on adding or removing a RIP network, refer to Section 13.1.1.2.

12.2.2.2 write

Use this command to save or delete the router running configuration, or to display it to output devices.

write [**erase** | **file** [**filename** *config_file*] | **terminal**]



NOTE: The **write file** command must be executed in order to save the router configuration to NVRAM. If this command is not executed, router configuration changes will not be saved upon reboot.

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Syntax Description

erase	(Optional) Deletes the router-specific file.
file	(Optional) Saves the router-specific configuration to NVRAM.
filename *config_file*	(Optional) Saves the router-specific configuration to a file.
terminal	(Optional) Displays the current router-specific configuration to the terminal session.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If no parameters are specified, the running configuration will be displayed to the terminal session.

Example

This example shows how to display the router-specific configuration to the terminal:

```
Matrix>Router#write terminal

Enable
Config t

interface vlan 1
 iP Address 182.127.63.1 255.255.255.0
 no shutdown
interface vlan 2
 iP Address 182.127.62.1 255.255.255.0
 no shutdown
exit

router rip
network 182.127.0.0
exit
disable
exit
```


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12.2.2.3 no ip routing

Use this command to disable IP routing on the device and remove the routing configuration. By default, IP routing is enabled when interfaces are configured for it as described in Section 12.2.1.

no ip routing

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to disable IP routing on the device:

```
Matrix>Router(config)#no ip routing
```


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12.2.3 Reviewing and Configuring the ARP Table

Purpose

To review and configure the routing ARP table, to enable proxy ARP on an interface, and to set a MAC address on an interface.

Commands

The commands needed to review and configure the ARP table are listed below and described in the associated section as shown:

- show ip arp (Section 12.2.3.1)
- arp (Section 12.2.3.2)
- ip gratuitous-arp-learning (Section 12.2.3.3)
- ip proxy-arp (Section 12.2.3.4)
- ip mac-address (Section 12.2.3.5)
- arp timeout (Section 12.2.3.6)
- clear arp-cache (Section 12.2.3.7)

12.2.3.1 show ip arp

Use this command to display entries in the ARP (Address Resolution Protocol) table. ARP converts an IP address into a physical address.

show ip arp [*ip_address*] [**vlan** *vlan_id*] [*output-modifier*]

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Syntax Description

ip_address	(Optional) Displays ARP entries related to a specific IP address.
vlan *vlan_id*	(Optional) Displays only ARP entries learned through a specific VLAN interface. This VLAN must be configured for IP routing as described in Section 3.3.2.
output-modifier	(Optional) Displays ARP entries within a specific range. Options are: • | **begin** *ip_address* — Displays only ARP entries that begin with the specified IP address. • | **exclude** *ip_address* — Excludes ARP entries matching the specified IP address. • | **include** *ip_address* — Includes ARP entries matching the specified IP address.

Configuration Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If no parameters are specified, all entries in the ARP cache will be displayed.

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Example

The following example shows how to use the **show ip arp** command:

```
Matrix>Router#show ip arp
Protocol     Address          Age (min) Hardware Addr   Type    Interface
------------------------------------------------------------------------
Internet     134.141.235.251     0      0003.4712.7a99  ARPA    Vlan1
Internet     134.141.235.165     -      0002.1664.a5b3  ARPA    Vlan1/fe.0.1
Internet     134.141.235.167     4      00d0.cf00.4b74  ARPA    Vlan2

Matrix>Router#show ip arp 134.141.235.165
Protocol     Address          Age (min)  Hardware Addr Type     Interface
------------------------------------------------------------------------
Internet     134.141.235.165     -      0002.1664.a5b3  ARPA    Vlan2

Matrix>Router#show ip arp vlan 2
Protocol     Address          Age (min) Hardware Addr Type      Interface
------------------------------------------------------------------------
Internet     134.141.235.251     0      0003.4712.7a99 ARPA      Vlan2
```

Table 12-3 provides an explanation of the command output.

Table 12-3 show ip arp Output Details

Output	What It Displays...
Protocol	ARP entry's type of network address.
Address	Network address mapped to the entry's MAC address.
Age (min)	Interval (in minutes) since the entry was entered in the table.
Hardware Addr	MAC address mapped to the entry's network address.
Type	Encapsulation type used for the entry's network address.
Interface	Interface (VLAN) through which the entry was learned.

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12.2.3.2 arp

Use this command to add or remove permanent ARP table entries.

arp *ip_address mac_address* **arpa**

Syntax Description

ip_address	Specifies the IP address of a device on the network. Valid values are IP addresses in dotted decimal notation.
mac_address	Specifies the 48-bit hardware address corresponding to the *ip_address* expressed in hexadecimal notation.
arpa	Specifies ARPA as the type of ARP mapping.

Command Syntax of the "no" Form

The "no" form of this command removes the specified permanent ARP entry:

no arp *ip-address*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

The following example shows how to add a permanent ARP entry for the IP address 130.2.3.1 and MAC address 0003.4712.7a99:

```
Matrix>Router(config)#arp 130.2.3.1 0003.4712.7a99 arpa
```

12.2.3.3 ip gratuitous-arp-learning

Use this command to allow an interface to learn new ARP bindings using gratuitous ARP.

ip gratuitous-arp-learning {**both** | **reply** | **request**}

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Syntax Description

both | **reply** | **request**	Allows learning from gratuitous ARP reply, ARP request, or both reply and request.

Command Syntax of the "no" Form

The "no" form of this command disables gratuitous ARP learning:

no ip gratuitous-arp-learning

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router1(config)#**

Command Defaults

None.

Example

This example shows how to enable gratuitous ARP learning for both requests and replies on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip gratuitous-arp-learning both
```

12.2.3.4 ip proxy-arp

Use this command to re-enable proxy ARP on an interface. This variation of the ARP protocol allows the router to send an ARP response on behalf of an end node to the requesting host. Proxy ARP can lessen bandwidth use on slow-speed WAN links. It is enabled by default.

ip proxy-arp

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables proxy ARP:

no ip proxy-arp

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Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

The following example shows how to enable proxy ARP on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip proxy-arp
```

12.2.3.5 ip mac-address

Use this command to set a MAC address on an interface.

ip mac-address *address*

Syntax Description

address	Specifies a 48-bit MAC address in hexadecimal format.

Command Syntax of the “no” Form

The “no” form of this command clears the MAC address:

no ip mac-address

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if (Vlan <vlan_id>))#**

Command Defaults

None.

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Example

The following example shows how to set an IP MAC address of 000A.000A.000B. on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip mac-address 000A.000A.000B
```

12.2.3.6 arp timeout

Use this command to set the duration (in seconds) for entries to stay in the ARP table before expiring.

arp timeout *seconds*

Syntax Description

seconds	Specifies the time in seconds that an entry remains in the ARP cache. Valid values are **15 - 65535**.

Command Syntax of the "no" Form

The "no" form of this command restores the default value of 1200 seconds (20 minutes):

no arp timeout *seconds*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to set the ARP timeout to 15 seconds:

```
Matrix>Router(config)#arp timeout 15
```

12.2.3.7 clear arp-cache

Use this command to delete all nonstatic (dynamic) entries from the ARP table.

clear arp-cache

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Syntax Description

None.

Configuration Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

Example

This example shows how to delete all dynamic entries from the ARP table:

```
Matrix>Router#clear arp-cache
```


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12.2.4 Configuring Broadcast Settings

Purpose

To configure IP broadcast settings.

Commands

The commands needed to configure IP broadcast settings are listed below and described in the associated section as shown:

- ip directed-broadcast (Section 12.2.4.1)
- ip helper-address (Section 12.2.4.3)
- ip forward-protocol (Section 12.2.4.2)

12.2.4.1 ip directed-broadcast

Use this command to enable or disable IP directed broadcasts on an interface.

ip directed-broadcast

Syntax Description

None.

Command Syntax of the “no” Form

The “no” form of this command disables IP directed broadcast globally:

no ip directed-broadcast

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to enable IP directed broadcasts on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip directed-broadcast
```

12.2.4.2 ip forward-protocol

Use this command to enable UDP broadcast forwarding and specify which protocols will be forwarded. This command works in conjunction with the **ip helper-address** command to configure UDP broadcast forwarding. For information on specifying a new destination for UDP broadcasts, refer to Section 12.2.4.3.

ip forward-protocol {**udp** [*port*]}

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Syntax Description

udp	Specifies UDP as the IP forwarding protocol.
port	(Optional) Specifies a destination port number or name that controls which UDP services are forwarded. Valid services and their corresponding names and port numbers are as follows. If not specified, the forwarding protocols are forwarded on the default ports listed: • **bootps** — Bootstrap Protocol server (**67**) • **domain** — Domain Name Service (**53**) • **nameserver** — IEN116 name service (**42**) • **netbios-dgm** — NetBIOS datagram service (**138**) • **netbios-ns** — NetBIOS name service (**137**) • **tacacs** — Terminal Access Controller Access Control System (**49**) • **tftp** — Trivial File Transfer Protocol (**69**) • **time** — Time (**37**) **NOTE:** If a certain service exists inside the node, and there is no need to forward the request to remote networks, the “no” form of this command should be used to disable the forwarding for the specific port. Such requests will not be automatically blocked from being forwarded, just because a service for them exists in the node.

Command Syntax of the “no” Form

The “no” form of this command removes a UDP port or protocol, disabling forwarding:

no ip forward-protocol {**udp** [*port*]}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

If *port* is not specified, default forwarding services will be performed as listed above and will act as a BOOTP/DHCP relay agent.

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Example

This example shows how to enable forwarding of Domain Naming System UDP datagrams (port 53):

```
Matrix>Router(config)#ip forward-protocol udp 53
```

About DHCP/BOOTP Relay

DHCP/BOOTP relay functionality is applied with the help of IP broadcast forwarding. A typical situation occurs when a host requests an IP address with no DHCP server located on that segment. A routing module can forward the DHCP request to a server located on another network if:

- IP forward-protocol is enabled for UDP as described in Section 12.2.4.2, and
- the address of the DHCP server is configured as a helper address on the receiving interface of the routing module forwarding the request, as described in Section 12.2.4.3.

The DHCP/BOOTP relay function will detect the DHCP request and make the necessary changes to the header, replacing the destination address with the address of the server, and the source with its own address, and send it to the server. When the response comes from the server, the DHCP/BOOTP relay function sends it to the host.

12.2.4.3 ip helper-address

Use this command to enable DHCP/BOOTP relay and the forwarding of local UDP broadcasts specifying a new destination address. This command works in conjunction with the **ip forward-protocol** command (Section 12.2.4.3), which defines the forward protocol and port number. You can use this command to add more than one helper address per interface, up to a maximum of 20 helper addresses per interface.

ip helper-address *address*

Syntax Description

address	Specifies a destination broadcast of host address used when forwarding.

Command Syntax of the “no” Form

The “no” form of this command disables the forwarding of UDP datagrams to the specified address:

no ip helper-address *address*

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Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to permit UDP broadcasts from hosts on networks 191.168.1.255 and 192.24.1.255 to reach servers on those networks:

```
Matrix>Router(config)#ip forward-protocol udp
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip helper-address 192.168.1.255
Matrix>Router(config)#interface vlan 2
Matrix>Router(config-if(Vlan 2))#ip helper-address 192.24.1.255
```


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12.2.5 Reviewing IP Traffic and Configuring Routes

Purpose

To review IP protocol information about the device, to review IP traffic and configure routes, to enable and send router ICMP (ping) messages, and execute traceroute.

Commands

The commands needed to review IP traffic and configure routes are listed below and described in the associated section as shown:

- show ip protocols (Section 12.2.5.1)
- show limits (Section 12.2.5.2)
- show ip traffic (Section 12.2.5.3)
- clear ip stats (Section 12.2.5.4)
- show ip route (Section 12.2.5.5)
- ip route (Section 12.2.5.6)
- ip icmp (Section 12.2.5.7)
- ping (Section 12.2.5.8)
- traceroute (Section 12.2.5.9)

12.2.5.1 show ip protocols

Use this command to display information about IP protocols running on the device.

show ip protocols

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

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Example

This example shows how to display IP protocol information. In this case, the routing protocol is RIP (Routing Information Protocol). For more information on configuring RIP parameters, refer to Section 13.1.1:

```
Matrix>Router#show ip protocols

Routing Protocol is "rip"
  Sending updates every 30 seconds
  Next due in 19 seconds
  Invalid after 180 seconds, hold down 120, flushed after 300
  Incoming update filter list for all interfaces is not set
  Outgoing update filter list for all interfaces is not set
  Default Version Control:
  Interface         Send        Recv        Key-chain
  Vlan    1         1           1
  Vlan    2         1           1
  Routing for Networks:
    182.127.0.0
  Routing Information Sources:
  Gateway         Distance        Last Update
  Distance: (default is 1)
```

12.2.5.2 show limits

Use this command to display memory usage information about IP protocols running on the device.

show limits

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

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Example

This example shows how to display memory usage information for IP protocols:

```
Matrix>Router(config)#show limits
                                    |      Entries      |    Memory (bytes)
 ( 64MgB)                  Resource |   Max-InUse=Avail | *Each ~=  Max   InUse
                           ======== | ===== ===== ===== | ===== ======= =======
                       Dynamic ARPs |  8192     0  8192 |    92  753664       0
                        Static ARPs |   512     0   512 |    92   47104       0
                       ARP Requests |    64     0    64 |    28    1792       0
                      Routing Table | 10000     0 10000 |   168 1680000       0
                      Static Routes |   512     0   512 |    44   22528       0
                          IP Helper |  5520     0  5520 |    12   66240       0
                 Router LSA(type 1) |   200     0   200 |  1672  167200       0
                Network LSA(type 2) |   400     0   400 |  1548  619200       0
                Summary LSA(type 3) |  2000     0  2000 |   248  496000       0
           ASBR Summary LSA(type 4) |  2000     0  2000 |   372  744000       0
               External LSA(type 5) |  3000     0  3000 |   372 1116000       0
                   NSSA LSA(type 7) |  3000     0  3000 |   428 1284000       0
 Opaque LSA - link-local(type 9)    |    64     0    64 |  1548   99072       0
Opaque LSA - Area-local(type 10)    |   512     0   512 |  1548  792576       0
    Opaque LSA - Global(type 11)    |    64     0    64 |  1548   99072       0
                        ACL Entries |  1000     0  1000 |    64   64000       0
                       DVMRP Routes | 10000     0 10000 |   120 1200000       0
                    Interface Count |   276     0   276 |   508  140208       0
                Configured Rip Nets |   300     0   300 |    12    3600       0
                          Rip Routes |  3000     0  3000 |    28   84000       0
                              Total: |                   |       9480256       0
```

12.2.5.3 show ip traffic

Use this command to display IP traffic statistics.

show ip traffic [**softpath**]

Syntax Description

softpath	(Optional) Displays IP protocol softpath statistics. This option is used for debugging.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

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Command Defaults

If **softpath** is not specified, general IP traffic statistics will be displayed.

Example

This example shows how to display IP traffic statistics:

```
Matrix>Router#show ip traffic

IP Statistics:
  Rcvd:   10 total, 6 local destination 0 header errors
          0 unknown protocol, 0 security failures
          Frags:   0 reassembled, 0 timeouts 0 couldn't reassemble
                   0 fragmented, 0 couldn't fragment
  Bcast:  1 received, 8 sent
  Mcast:  0 received, 16 sent
  Sent:   24 generated, 0 forwarded

         0 no route
  ICMP Statistics:
    Rcvd:  4 total, 0 checksum errors, 0 redirects, 0 unreachable, 4 echo
               0 echo reply, 0 mask requests, 0 quench
               0 parameter, 0 timestamp, 0 time exceeded,
    Sent:  6 total, 0 redirects, 0 unreachable, 0 echo, 4 echo reply
               0 mask requests, 2 mask replies, 0 quench, 0 timestamp

            0 info reply, 0 time exceeded, 0 parameter problem

  UDP Statistics:
    Rcvd:  1 total, 0 checksum errors, 1 no port
    Sent:  6 total, 0 forwarded broadcasts

  TCP Statistics:
    Rcvd:  0 total, 0 checksum errors, 0 no port
    Sent:  0 total

  IGMP Statistics:
    Rcvd:  Messages 1  Errors 0
        Reports 1   Queries 0
        Leaves 0    Unknowntype 0
   Sent: OutMessages 2

  ARP Statistics:
    Rcvd:  1 requests, 0 replies, 0 others
    Sent:  0 requests, 1 replies
```


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12.2.5.4 clear ip stats

Use this command to clear all IP traffic counters (IP, ICMP, UDP, TCP, IGMP, and ARP).

clear ip stats

Syntax Description

None.

Configuration Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

Example

This example shows how to clear all IP traffic counters:

```
Matrix>Router#clear ip stats
```

12.2.5.5 show ip route

Use this command to display information about IP routes.

show ip route [*destination prefix destination prefix mask* **longer-prefixes** | **connected** | **ospf** | **rip** | **static** | **summary**]

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Syntax Description

destination prefix *destination prefix mask* **longer-prefixes**	(Optional) Converts the specified address and mask into a prefix and displays any routes that match the prefix.
connected	(Optional) Displays connected routes.
ospf	(Optional) Displays routes configured for the OSPF routing protocol.
rip	(Optional) Displays routes configured for the RIP routing protocol.
static	(Optional) Displays static routes.
summary	(Optional) Displays a summary of the IP routing table.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If no parameters are specified, all IP route information will be displayed.

Example

This example shows how to display all IP route information. In this case, there are two IP routes and each one is directly connected to a VLAN:

```
Matrix>Router#show ip route
Codes: C-connected, S-static, R-RIP, B-BGP, O-OSPF, IA-OSPF interarea
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - 0SPF external type 1, E2 - 0SPF external type 2
       E - EGP, i - IS-IS, L1 - IS-IS level-1, LS - IS-IS level-2
       * - candidate default, U - per-user static route, o - ODR
Gateway of last resort is not set
C     182.127.63.0/24 [0001] directly connected, Vlan 1
C     182.127.62.0/24 [0001] directly connected, Vlan 2
```


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12.2.5.6 ip route

Use this command to add or remove a static IP route.

ip route *prefix mask* {*forward-addr* | **vlan** *vlan-id*} [*distance*] [**permanent**] [**tag** *value*]

Syntax Description

prefix	Specifies a destination IP address prefix.
mask	Specifies a destination prefix mask.
forward-addr | **vlan** *vlan-id*	Specifies a forwarding (gateway) IP address or routing (VLAN) interface ID.
distance	(Optional) Specifies a distance metric for this route. Valid values are **1** to **255.**
permanent	(Optional) Specifies a permanent route.
tag *value*	(Optional) Specifies a tag for this route. Valid values are **1** to **4294967295**.

Command Syntax of the "no" Form

The "no" form of this command removes the static IP route:

no ip route *prefix mask* {*forward-addr* | **vlan** *vlan-id*}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

If **permanent** and **tag** are not specified, the route will be set as non-permanent with no tag assigned.

Examples

This example shows how to set IP address 10.1.2.3 as the next hop gateway to destination address 10.0.0.0. The route is assigned a tag of 1:

```
Matrix>Router(config)#ip route 10.0.0.0 255.0.0.0 10.1.2.3 1
```


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This example shows how to set IP address 10.1.2.3 as the next hop gateway to destination address 10.0.0.0. The route is set as permanent and assigned a tag of 20:

```
Matrix>Router(config)#ip route 10.0.0.0 255.0.0.0 10.1.2.3 permanent tag 20
```

This example shows how to set VLAN 100 as the next hop interface to destination address 10.0.0.0:

```
Matrix>Router(config)#ip route 10.0.0.0 255.0.0.0 vlan 100
```

12.2.5.7 ip icmp

Use this command to re-enable the Internet Control Message Protocol (ICMP), allowing a router to reply to IP ping requests. By default, ICMP messaging is enabled on a routing interface for both echo-reply and mask-reply modes. If, for security reasons, ICMP has been disabled using **no ip icmp**, this command will re-enable it on the routing interface.

ip icmp {**echo-reply** | **mask-reply**}

Syntax Description

echo-reply	Enables ICMP in echo-reply mode.
mask-reply	Enables ICMP in mask-reply mode.

Command Syntax of the “no” Form

The “no” form of this command disables ICMP:

no ip icmp {**echo-reply** | **mask-reply**}

Command Type

Router command.

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Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to enable ICMP in echo-reply mode on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip icmp echo-reply
```

12.2.5.8 ping

Use this command to test routing network connectivity by sending IP ping requests. The ping utility (IP ping only) transmits a maximum of five echo requests, with a packet size of 100. The application stops when the response has been received, or after the maximum number of requests has been sent.

ping [**-s**] *hostname* | *ip_address*

Syntax Description

-s	(Optional) Causes a continuous ping, sending one datagram per second and printing one line of output for every response received, until the user enters Ctrl+C.
hostname | *ip_address*	Specifies a host name or an IP address of the system to ping.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If **-s** is not specified, the ping will not be sent continuously.

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Example

This example shows output from a successful ping to IP address 182.127.63.23:

```
Matrix>Router#ping 182.127.63.23
Reply from 182.127.63.23
Reply from 182.127.63.23
Reply from 182.127.63.23

------ PING 182.127.63.23 : Statistics ------
 3 packets transmitted, 3 packets received, 0% packet loss
```

This example shows output from an unsuccessful ping to IP address 182.127.63.24:

```
Matrix>Router#ping 182.127.63.24
Timed Out
Timed Out
Timed Out

 ------ PING 182.127.63.24 : Statistics ------
 3 packets transmitted, 0 packets received, 100% packet loss
```

12.2.5.9 traceroute

Use this command to display a hop-by-hop path through an IP network from the device to a specific destination host. Three ICMP probes will be transmitted for each hop between the source and the traceroute destination.

traceroute *host*

Syntax Description

host	Specifies a host to which the route of an IP packet will be traced.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

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Example

This example shows how to use traceroute to display a round trip path to host 192.167.252.46. In this case, hop 1 is an unnamed router at 192.167.201.2, hop 2 is “rtr10” at 192.4.9.10, hop 3 is “rtr43” at 192.167.208.43, and hop 4 is back to the host IP address. Round trip times for each of the three ICMP probes are displayed before each hop. Probe time outs are indicated by an asterisk (*):

```
Matrix>Router#traceroute 192.167.225.46
Traceroute to 192.167.225.46, 30 hops max, 40 byte packets
1  10.00 ms  20.00 ms  20.00 ms  192.167.201.2 []
2  20.00 ms  20.00 ms  20.00 ms  192.4.9.10 [enatel-rtr10.enatel.com]
3  240.00 ms  *         480.00 ms  192.167.208.43 [enatel-rtr43.enatel.com]
4  <1 ms     *         20.00 ms  192.167.225.46 [enatel-rtr46.enatel.com]

TraceRoute Complete
```


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13

Routing Protocol Configuration

This chapter describes the Routing Protocol Configuration set of commands and how to use them.

ROUTER: The commands covered in this chapter can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

13.1 PROCESS OVERVIEW: ROUTING PROTOCOL CONFIGURATION

Use the following steps as a guide to configuring routing protocols on the device:

1. Configuring RIP (Section 13.1.1)
2. Configuring OSPF (Section 13.1.2)
3. Configuring DVMRP (Section 13.1.3)
4. Configuring IRDP (Section 13.1.4)
5. Configuring VRRP (Section 13.1.5)

NOTE: The command prompts used in examples throughout this guide show a system where VLAN 1 has been configured for routing. The prompt changes depending on your current configuration mode, and the interface types and numbers configured for routing on your system.

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13.1.1 Configuring RIP

Purpose

To enable and configure the Routing Information Protocol (RIP).

RIP Configuration Task List and Commands

Table 13-1 lists the tasks and commands associated with RIP configuration. Commands are described in the associated section as shown.

NOTE: Enabling RIP with the **router rip** and **network** commands is required if you want to run RIP on the device. All other tasks are optional.

Table 13-1 RIP Configuration Task List and Commands

To do this...	Use these commands...
Enable RIP configuration mode and associate a network.	router rip (Section 13.1.1.1)
	network (RIP) (Section 13.1.1.2)
Allow unicast updates by defining a neighboring router.	neighbor (RIP) (Section 13.1.1.3)
Configure an administrative distance.	distance (Section 13.1.1.4)
Apply offsets to RIP routing metrics.	ip rip offset (Section 13.1.1.5)
Adjust timers.	timers (Section 13.1.1.6)
Specify a RIP version.	ip rip send version (Section 13.1.1.7)
	ip rip receive version (Section 13.1.1.8)

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Table 13-1 RIP Configuration Task List and Commands (Continued)

To do this...	Use these commands...
Configure RIP authentication.	key chain (Section 13.1.1.9)
	key (Section 13.1.1.10)
	key-string (Section 13.1.1.11)
	accept-lifetime (Section 13.1.1.12)
	send-lifetime (Section 13.1.1.13)
	ip rip authentication keychain (Section 13.1.1.14)
	ip rip authentication mode (Section 13.1.1.15)
Disable automatic route summarization (necessary for enabling CIDR)	no auto-summary (Section 13.1.1.16)
Disable triggered updates.	ip rip disable-triggered-updates (Section 13.1.1.17)
Disable or re-enable split horizon.	ip split-horizon (Section 13.1.1.18)
Control the processing of routing updates.	passive-interface (Section 13.1.1.19)
	receive interface (Section 13.1.1.20)
	distribute-list (Section 13.1.1.21)
Enable redistribution from non-RIP routes.	redistribute (Section 13.1.1.22)

13.1.1.1 router rip

Use this command to enable or disable RIP configuration mode.

router rip

NOTE: You must execute the **router rip** command to enable the protocol before completing many RIP-specific configuration tasks. For details on enabling configuration modes, refer to Table 3-10 in Section 3.3.3.

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Syntax Description

None.

Command Syntax of the “no” Form

The “no” form of this command disables RIP:

no router rip

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to enable RIP:

```
Matrix>Router#configure terminal
Matrix>Router(config)#router rip
Matrix>Router(config-router)#
```

13.1.1.2 network

Use this command to attach a network of directly connected networks to a RIP routing process, or to remove a network from a RIP routing process.

network *ip_address*

Syntax Description

ip_address	Specifies the IP address of a directly connected network that RIP will advertise to its neighboring routers.

Command Syntax of the “no” Form

The “no” form of this command removes the network from the RIP routing process:

no network *ip_address*

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Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to attach network 192.168.1.0 to the RIP routing process:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#network 192.168.1.0
```

13.1.1.3 neighbor

Use this command to instruct the router to send unicast RIP information to a specific IP address.

neighbor *ip_address*

Syntax Description

ip_address	Specifies the IP address of a directly connected network.

Command Syntax of the "no" Form

The "no" form of this command disables point-to-point routing exchanges:

no neighbor *ip_address*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

This example shows how to instruct the system to send unicast RIP information to network 192.5.10.1:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#neighbor 192.5.10.1
```

13.1.1.4 distance

Use this command to configure the administrative distance for RIP routes. If several routes (coming from different protocols) are presented to the Matrix E1 Series Route Table Manager (RTM), the protocol with the lowest administrative distance will be chosen for route installation. By default, RIP administrative distance is set to 120. The **distance** command can be used to change this value, resetting RIP's route preference in relation to other routes as shown in the table below.

Route Source	Default Distance
Connected	0
Static	1
OSPF	110
RIP	120

distance *weight*

Syntax Description

weight	Specifies an adminstrative distance for RIP routes. Valid values are **1 - 255**.

Command Syntax of the "no" Form

The "no" form of this command resets RIP administrative distance to the default value of 120:

no distance [*weight*]

Command Type

Router command.

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Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to change the default administrative distance for RIP to 1001:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#distance 100
```

13.1.1.5 ip rip offset

Use this command to add or remove an offset to the metric of an incoming or outgoing RIP route. Adding an offset on an interface is used for the purpose of making an interface a backup.

ip rip offset {**in** | **out**} *value*

Syntax Description

in	Applies the offset to incoming metrics.
out	Applies the offset to outgoing metrics.
value	Specifies a positive offset to be applied to routes learned via RIP. Valid values are from **0** to **16**. If the value is 0, no action is taken.

Command Syntax of the "no" Form

The "no" form of this command removes an offset:

no ip rip offset {**in** | **out**}

Command Type

Router command.

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Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

The following example shows how to add an offset of 1 to incoming RIP metrics on VLAN 1:

```
Matrix>Router(config)#vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip offset in 1
```

13.1.1.6 timers

Use this command to adjust RIP routing timers determining the frequency of routing updates, the length of time before a route becomes invalid, and the interval during which routing information regarding better paths is suppressed.

timers basic *update_seconds invalid_seconds holdown_seconds flush_seconds*

Syntax Description

basic	Specifies a basic configuration for RIP routing timers.
update_seconds	Specifies the rate (seconds between updates) at which routing updates are sent. Valid values are **0** to **4294967295**.
invalid_seconds	Specifies the interval (in seconds) after which a route is declared invalid. Valid values are **1** to **4294967295**.
holdown_seconds	Specifies the interval (in seconds) during which routing information regarding better paths is suppressed. Valid values are **0** to **4294967295**.
flush_seconds	Specifies the interval (in seconds) after which a route is deleted. Valid values are **0** to **4294967295**.

Command Syntax of the “no” Form

The “no” form of this command clears RIP timer parameters:

no timers basic

Command Type

Router command.

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Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set RIP timers to a 5 second update time, a 10 second invalid interval, a 20 second holdown time, and a 60 second flush time:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#timers basic 5 10 20 60
```

13.1.1.7 ip rip send version

Use this command to set the RIP version(s) for update packets transmitted on an interface.

ip rip send version {**1** | **2** | **r1compatible**}

Syntax Description

1	Specifies RIP version 1.
2	Specifies RIP version 2.
r1compatible	Specifies that packets be sent as version 2 packets, but transmits these as broadcast packets rather than multicast packets so that systems which only understand RIP version 1 can receive them.

Command Syntax of the “no” Form

The “no” form of this command restores the version of update packets transmitted by RIP:

no ip rip send version

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

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Command Defaults

None.

Example

This example shows how to set the RIP send version to 2 for packets transmitted on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip send version 2
```

13.1.1.8 ip rip receive version

Use this command to set the RIP version(s) for update packets accepted on the interface.

ip rip receive version {**1** | **2** | **1 2** | **none**}

Syntax Description

1	Specifies RIP version 1.
2	Specifies RIP version 2.
12	Specifies both versions 1 and 2.
none	Specifies that no RIP routes will be processed on this interface.

Command Syntax of the "no" Form

The "no" form of this command restores the default version of the RIP update packets that are accepted on the interface:

no ip rip receive version

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to set the RIP receive version to 2 for update packets received on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip receive version 2
```

About RIP Authentication

The following tasks must be completed to configure RIP authentication on the Matrix E1 device:

1. Create a key chain as described in Section 13.1.1.9.
2. Add a key to the chain as described in Section 13.1.1.10.
3. Specify an authentication string for the key as described in Section 13.1.1.11.
4. Set the time periods the authentication string can be received and sent as valid as described in Section 13.1.1.12 and Section 13.1.1.13.
5. Enable a key chain for use on an interface as described in Section 13.1.1.14.
6. Specify an authentication mode as described in Section 13.1.1.15.

13.1.1.9 key chain

Creates or deletes a key chain used globally for RIP authentication.

key chain *name*

Syntax Description

name	Specifies a name for the key chain.

Command Syntax of the “no” Form

The “no” form of this command deletes the specified key chain:

no key chain *name*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

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Command Defaults

None.

Example

This example shows how to create a RIP authentication key chain called “password”:

```
Matrix>Router(config)#key chain password
```

13.1.1.10key

Use this command to identify a RIP authentication key on a key chain.

key *key-id*

NOTE: This release of the Matrix E1 supports only **one** key per key chain.

Syntax Description

key-id	Specifies an authentication number for a key. Valid number are from **0** to **4294967295**. Only one key is supported per key chain in this Matrix E1 release.

Command Syntax of the “no” Form

The “no” form of this command removes the key from the key chain:

no key *key-id*

Command Type

Router command.

Command Mode

Key chain configuration: **Matrix>Router(config-keychain)#**

Command Defaults

None.

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Example

This example shows how to create authentication key **1** within the key chain called “password”:

```
Matrix>Router(config-router)#key chain password
Matrix>Router(config-keychain)#key 1
```

13.1.1.11key-string

Use this command to specify an authentication string for a key. Once configured, this string must be sent and received in RIP packets in order for them to be authenticated.

key-string *text*

Syntax Description

text	Specifies the authentication string that must be sent and received in RIP packets. The string can contain from 1 to 16 uppercase and lowercase alphanumeric characters, except that the first character cannot be a number.

Command Syntax of the “no” Form

The “no” form of this command removes the authentication string:

no key-string *text*

Command Type

Router command.

Command Mode

Key chain key configuration: **Matrix>Router(config-keychain-key)#**

Command Defaults

None.

Example

This example shows how to create an authentication string called “name” for key 1 in the “password” key chain:

```
Matrix>Router(config-router)#key chain password
Matrix>Router(config-keychain)#key 1
Matrix>Router(config-keychain-key)#name
```


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13.1.1.12accept-lifetime

Use this command to specify the time period during which an authentication key on a key chain is valid to be received.

accept-lifetime *start-time month date year* {**duration** *seconds* | *end-time* | **infinite**}

Syntax Description

start-time	Specifies the time of day the authentication key will begin to be valid to be received. Valid input is hours:minutes:seconds (*hh:mm:ss*)
month	Specifies the month the authentication key will begin to be valid to be received. Valid input is the first three letters of the month.
date	Specifies the day of the month the authentication key will begin to be valid to be received. Valid values, depending on the length of the month, are **1 - 31**.
year	Specifies the year the authentication key will begin to be valid to be received. Valid input is four digits up to **2035**.
duration *seconds*	Length of time (in seconds) the key is valid to be received. Valid values are **1 - 4294967295**.
end-time	Specifies the hours, minutes and seconds (*hh:mm:ss)* and the *month*, *date* and *year* from the start-time the key is valid to be received.
infinite	Specifies that the key is valid to be received from the start-time on.

Command Syntax of the “no” Form

The “no” form of this command removes the accept-lifetime configuration for an authentication key:

no accept-lifetime *start-time month date year*

Command Type

Router command.

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Command Mode

Key chain key configuration: **Matrix>Router(config-keychain-key)#**

Command Defaults

None.

Example

This example shows how to allow the “name” authentication key to be received as valid on its RIP-configured interface beginning at 2:30 on November 30, 2002 with no ending time (infinitely):

```
Matrix>Router(config-router)#key chain md5key
Matrix>Router(config-keychain)#key 3
Matrix>Router(config-keychain-key)#key-string name
Matrix>Router(config-keychain-key)#accept-lifetime 02:30:00 nov 30 2002
  infinite
```

13.1.1.13send-lifetime

Use this command to specify the time period during which an authentication key on a key chain is valid to be sent.

send-lifetime *start-time month date year* {**duration** *seconds* | *end-time* | **infinite**}

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Syntax Description

start-time	Specifies the time of day the authentication key will begin to be valid to be sent. Valid input is hours:minutes:seconds (*hh:mm:ss*)
month	Specifies the month the authentication key will begin to be valid to be sent. Valid input is the first three letters of the month.
date	Specifies the day of the month the authentication key will begin to be valid to be sent. Valid values, depending on the length of the month, are **1 - 31**.
year	Specifies the year the authentication key will begin to be valid to be sent. Valid input is four digits up to **2035**.
duration *seconds*	Length of time (in seconds) the key is valid to be sent. Valid values are **1 - 4294967295**.
end-time	Specifies the hours, minutes and seconds (*hh:mm:ss)* and the *month*, *date* and *year* from the start-time the key is valid to be sent.
infinite	Specifies that the key is valid to be sent from the start-time on.

Command Syntax of the "no" Form

The "no" form of this command removes the send-lifetime configuration for an authentication key. Start time can be specified, but is not mandatory:

no send-lifetime [*start-time month date year*]

Command Type

Router command.

Command Mode

Key chain key configuration: **Matrix>Router(config-keychain-key)#**

Command Defaults

None.

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Example

This example shows how to allow the “name” authentication key to be sent as valid on its RIP-configured interface beginning at 2:30 on November 30, 2002 with no ending time (infinitely):

```
Matrix>Router(config-router)#key chain md5key
Matrix>Router(config-keychain)#key 3
Matrix>Router(config-keychain-key)#key-string name
Matrix>Router(config-keychain-key)#send-lifetime 02:30:00 nov 30 2002 infinite
```

13.1.1.14ip rip authentication keychain

Use this command to enable or disable a RIP authentication key chain for use on an interface.

ip rip authentication keychain *name*

NOTE: A RIP authentication keychain must be enabled with this command before the RIP authentication mode (Section 13.1.1.15) can be configured.

Syntax Description

name	Specifies the key chain name to enable or disable for RIP authentication.

Command Syntax of the “no” Form

The “no” form of this command prevents RIP from using authentication:

no ip rip authentication keychain *name*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to set the RIP authentication key chain to **password** on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip authentication keychain password
```

13.1.1.15ip rip authentication mode

Use this command to set the authentication mode when a key chain is present.

ip rip authentication mode {**text** | **md5**}

NOTE: The RIP authentication keychain must be enabled as described in Section 13.1.1.14 before RIP authentication mode can be configured.

Syntax Description

text	Initiates text-only authentication.
md5	Initiates MD5 authentication.

Command Syntax of the "no" Form

The "no" form of this command suppresses the use of authentication:

no ip rip authentication mode

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the authentication mode for VLAN 1 as "text":

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip authentication mode text
```


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13.1.1.16no auto-summary

Use this command to disable automatic route summarization. By default, RIP version 2 supports automatic route summarization, which summarizes subprefixes to the classful network boundary when crossing network boundaries. Disabling automatic route summarization enables CIDR, allowing RIP to advertise all subnets and host routing information on the Matrix E1 Series device. To verify which routes are summarized for an interface, use the **show ip protocols** command as described in Section 12.2.5.1.

no auto-summary

NOTE: This command is necessary for enabling CIDR for RIP on the Matrix E1 Series device.

Syntax Description

None.

Syntax to Reverse Command

This form of the command re-enables automatic route summarization:

auto-summary

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to disable RIP automatic route summarization:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#no auto-summary
```


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13.1.1.17ip rip disable-triggered-updates

Use this command to prevent RIP from sending triggered updates. Triggered updates are sent when there is a change in the network and a new route with a lower metric is learned, or an old route is lost. This command stops or starts the interface from sending these triggered updates. By default triggered updates are enabled on a RIP interface.

ip rip disable-triggered-updates

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command allows RIP to respond to a request for a triggered update:

no ip rip disable-triggered-updates

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to prevent RIP from responding to a request for triggered updates on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip rip disable-triggered-updates
```

13.1.1.18ip split-horizon

Use this command to enable or disable split horizon mode for RIP packets. Split horizon prevents packets from exiting through the same interface on which they were received.

ip split-horizon [**poison**]

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Syntax Description

poison	(Optional) Specifies that split horizon be performed with poison-reverse. This explicitly indicates that a network is unreachable, rather than implying it by not including the network in routing updates.

Command Syntax of the "no" Form

The "no" form of this command resets the mode to split-horizon without poison reverse:

no ip split-horizon poison

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

If not specified, IP split horizon is enabled without **poison** reverse.

Example

This example shows how to set the split horizon mode with poison reverse for RIP packets transmitted on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#no ip split-horizon poison
```

13.1.1.19passive-interface

Use this command to prevent RIP from transmitting update packets on an interface.

passive-interface vlan *vlan_id*

NOTE: This command does not prevent RIP from monitoring updates on the interface.

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Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN to make a passive interface. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Syntax of the "no" Form

The "no" form of this command disables passive interface:

no passive-interface vlan *vlan_id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set VLAN 2 as a passive interface. No RIP updates will be transmitted on VLAN 2:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#passive-interface vlan 2
```

13.1.1.20receive-interface

Use this command to allow RIP to receive update packets on an interface. This does not affect the sending of RIP updates on the specified interface.

receive-interface vlan *vlan_id*

Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN to make a receive interface. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Syntax of the "no" Form

The no use of this command denies the reception of RIP updates:

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no receive-interface vlan *vlan_id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to deny the reception of RIP updates on VLAN 2:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#no receive-interface vlan 2
```

13.1.1.21 distribute-list

Use this command to filter networks received and to suppress networks from being advertised in RIP updates.

distribute-list *access-list-number* {**in vlan** *vlan_id* | **out vlan** *vlan_id*}

Syntax Description

access-list-number	Specifies the number of the IP access list. This list defines which networks are to be advertised and which are to be suppressed in routing updates. For details on how to configure access lists, refer to Section 14.3.7.
in vlan *vlan_id* | **out vlan** *vlan_id*	Applies the access list to incoming or outgoing routing updates on the specified VLAN. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Syntax of the "no" Form

The "no" form of this command removes the filter:

no distribute-list *access-list-number* {**in vlan** *vlan_id* | **out vlan** *vlan_id*}

Command Type

Router command.

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Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to suppress the network 192.5.34.0 from being advertised in outgoing routing updates:

```
Matrix>Router(config)#access-list 1 deny 192.5.34.0 0.0.0.255
Matrix>Router(config)#router rip
Matrix>Router(config-router)#distribute-list 1 out vlan
```

13.1.1.22redistribute

Use this command to allow routing information discovered through non-RIP protocols to be distributed in RIP update messages.

redistribute {**connected** | **ospf** *process_id* | **static**} [**metric** *metric value*] [**subnets**]

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Syntax Description

connected	Specifies that non-RIP routing information discovered via directly connected interfaces will be redistributed.
ospf	Specifies that OSPF routing information will be redistributed in RIP.
process-id	Specifies the process ID, an internally used identification number for each instance of the OSPF routing process run on a router. Valid values are **1** to **65535**.
static	Specifies that non-RIP routing information discovered via static routes will be redistributed. Static routes are those created using the **ip route** command detailed in Section 12.2.5.6.
metric *metric value*	(Optional) Specifies a metric for the connected, OSPF or static redistribution route. This value should be consistent with the designation protocol.
subnets	(Optional) Specifies that connected, OSPF or static routes that are subnetted will be redistributed.

Command Syntax of the “no” Form

The “no” form of this command clears redistribution parameters:

no redistribute {**connected** | **ospf** *process_id* | **static**}

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

- If *metric value* is not specified, 1 will be applied.
- If **subnets** is not specified, only non-subnetted routes will be redistributed.

Example

This example shows how to redistribute routing information discovered through OSPF process ID 1 non-subnetted routes into RIP update messages:

```
Matrix>Router(config)#router rip
Matrix>Router(config-router)#redistribute ospf 1
```


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13.1.2 Configuring OSPF

Purpose

To enable and configure the Open Shortest Path First (OSPF) routing protocol.

OSPF Configuration Task List and Commands

Table 13-2 lists the tasks and commands associated with OSPF configuration. Commands are described in the associated section as shown.

NOTE: Enabling OSPF with the **router ospf** and **network** commands are required if you want to run OSPF on the device. All other tasks are optional.

Table 13-2 OSPF Configuration Task List and Commands

To do this...	Use these commands...
Enable OSPF configuration mode, associate a network and assign a router ID.	router ospf (Section 13.1.2.1)
	network (Section 13.1.2.2)
	router id (Section 13.1.2.3)
Configure OSPF Interface Parameters.	
• Set the cost of sending a packet on an OSPF interface.	ip ospf cost (Section 13.1.2.4)
• Set priority to help determine the OSPF designated router for the network.	ip ospf priority (Section 13.1.2.5)
• Adjust timers and message intervals.	timers spf (Section 13.1.2.6)
	ip ospf retransmit-interval (Section 13.1.2.7)
	ip ospf transmit-delay (Section 13.1.2.8)
	ip ospf hello-interval (Section 13.1.2.9)
	ip ospf dead-interval (Section 13.1.2.10)

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Table 13-2 OSPF Configuration Task List and Commands (Continued)

To do this...	Use these commands...
• Configure OSPF authentication.	ip ospf authentication-key (Section 13.1.2.11)
	ip ospf message digest key md5 (Section 13.1.2.12)
Configure OSPF Areas.	
• Configure an administrative distance.	distance ospf (Section 13.1.2.13)
• Define the range of addresses to be used by Area Boundary Routers (ABRs).	area range (Section 13.1.2.14)
• Enable area authentication.	area authentication (Section 13.1.2.15)
• Define an area as a stub area.	area stub (Section 13.1.2.16)
• Set the cost value for the default route that is sent into a stub area.	area default cost (Section 13.1.2.17)
• Define an area as an NSSA.	area nssa (Section 13.1.2.18)
Create virtual links.	area virtual-link (Section 13.1.2.19)
Enable passive OSPF mode on an interface.	passive-ospf (Section 13.1.2.20)
Enable redistribution from non-OSPF routes.	redistribute (Section 13.1.2.21)
Limit link state database overflow.	database-overflow (Section 13.1.2.22)

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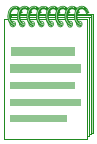
Table 13-2 OSPF Configuration Task List and Commands (Continued)

To do this...	Use these commands...
Monitor and maintain OSPF.	show ip ospf (Section 13.1.2.23)
	show ip ospf database (Section 13.1.2.24)
	show ip ospf border-routers (Section 13.1.2.25)
	show ip ospf interface (Section 13.1.2.26)
	show ip ospf neighbor (Section 13.1.2.27)
	show ip ospf virtual-links (Section 13.1.2.28)
	clear ip ospf process (Section 13.1.2.29)

13.1.2.1 router ospf

Use this command to enable or disable Open Shortest Path First (OSPF) configuration mode.

router ospf *process-id*



NOTE: You must execute the **router ospf** command to enable the protocol before completing many OSPF-specific configuration tasks. For details on enabling configuration modes, refer to Table 3-10 in Section 3.3.3.

Syntax Description

process-id	Specifies the process ID, an internally used identification number for each instance of the OSPF routing process run on a router. Valid values are **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command disables OSPF configuration mode:

no router ospf *process-id*

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

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Command Defaults

None.

Example

This example shows how to enable routing for OSPF process 1:

```
Matrix>Router#conf terminal
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#
```

13.1.2.2 network

Use this command to configure area IDs for OSPF interfaces.

network *ip_address wildcard_mask* **area** *area-id*

Syntax Description

ip_address	Specifies the IP address of an interface or a group of interfaces within the network address range.
wildcard_mask	Specifies the IP-address-type mask that includes “don't care” bits.
area *area-id*	Specifies the *area-id* to be associated with the OSPF address range. Valid values are decimal values or IP addresses. A subnet address can be specified as the *area-id* to associate areas with IP subnets.

Command Syntax of the “no” Form

The “no” form of this command removes OSPF routing for interfaces identified by the IP address and mask parameters:

no network *ip_address wildcard_mask* **area** *area-id*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

This example shows how to configure IP address 182.127.62.1 0.0.0.31 as OSPF area 0:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#network 182.127.62.1 0.0.0.31 area 0
```

13.1.2.3 router id

Use this command to set the OSPF router ID for the device. The OSPF protocol uses the router ID as a tie-breaker for path selection. If not specified, this will be set to the lowest IP address of the interfaces configured for IP routing.

router id *ip_address*

Syntax Description

ip_address	Specifies the IP address that OSPF will use as the router ID.

Command Syntax of the "no" Form

The "no" form of this command resets the router ID to the first interface configured for IP routing:

no router id

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set the OSPF router ID to IP address 182.127.62.1:

```
Matrix>Router(config-router)#router id 182.127.62.1
```


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13.1.2.4 ip ospf cost

Use this command to set the cost of sending a packet on an interface. Each router interface that participates in OSPF routing is assigned a default cost. This command overwrites the default of 10.

ip ospf cost *cost*

Syntax Description

cost	Specifies the cost of sending a packet. Valid values range from **1** to **65535**.

Command Syntax of the "no" Form

The "no" form of this command resets the OSPF cost to the default of 10:

no ip ospf cost

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the OSPF cost to 20 for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf cost 20
```

13.1.2.5 ip ospf priority

Use this command to set the OSPF priority value for router interfaces. The priority value is communicated between routers by means of hello messages and influences the election of a designated router.

ip ospf priority *number*

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Syntax Description

number	Specifies the router's OSPF priority in a range from **0** to **255**.

Command Syntax of the "no" Form

The "no" form of this command resets the value to the default of 1:

no ip ospf priority

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the OSPF priority to 20 for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf priority 20
```

13.1.2.6 timers spf

Use this command to change OSPF timer values to fine-tune the OSPF network.

timers spf *spf-delay spf-hold*

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Syntax Description

spf-delay	Specifies the delay, in seconds, between the receipt of an update and the SPF execution. Valid values are **0** to **4294967295**.
spf-hold	Specifies the minimum amount of time, in seconds, between two consecutive OSPF calculations. Valid values are **0** to **4294967295**. A value of 0 means that two consecutive OSPF calculations are performed one immediately after the other.

Command Syntax of the "no" Form

The "no" form of this command restores the default timer values (5 seconds for delay and 10 seconds for holdtime):

no timers spf

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set spf delay time to 7 seconds and hold time to 3:

```
Matrix>Router(config)#ospf 1
Matrix>Router(config-router)#timers spf 7 3
```

13.1.2.7 ip ospf retransmit-interval

Use this command to set the amount of time between retransmissions of link state advertisements (LSAs) for adjacencies that belong to an interface.

ip ospf retransmit-interval *seconds*

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Syntax Description

seconds	Specifies the retransmit time in seconds. Valid values are **1** to **3600**.

Command Syntax of the "no" Form

The "no" form of this command resets the retransmit interval value to the default, 5 seconds:

no ip ospf retransmit-interval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the OSPF retransmit interval for VLAN 1 to 20:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf retransmit-interval 20
```

13.1.2.8 ip ospf transmit-delay

Use this command to set the amount of time required to transmit a link state update packet on an interface.

ip ospf transmit-delay *seconds*

Syntax Description

seconds	Specifies the transmit delay in seconds. Valid values are from **1** to **3600**.

Command Syntax of the "no" Form

The "no" form of this command resets the retransmit interval value to the default, 1 second:

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no ip ospf transmit-delay

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the time required to transmit a link state update packet on VLAN 1 at 20 seconds:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf transmit-delay 20
```

13.1.2.9 ip ospf hello-interval

Use this command to set the number of seconds a router must wait before sending a hello packet to neighbor routers on an interface.

ip ospf hello-interval *seconds*

Syntax Description

seconds	Specifies the hello interval in seconds. Hello interval must be the same on neighboring routers (on a specific subnet), but can vary between subnets. This parameter is an unsigned integer with valid values between **1** and **65535**.

Command Syntax of the “no” Form

The “no” form of this command sets the hello interval value to the default (10 seconds for broadcast and point-to-point networks, 30 seconds for non-broadcast and point-to-multipoint networks):

no ip ospf hello-interval

Command Type

Router command.

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Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the hello interval to 5 for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf hello-interval 5
```

13.1.2.10ip ospf dead-interval

Use this command to set the number of seconds a router must wait to receive a hello packet from its neighbor before determining that the neighbor is out of service.

ip ospf dead-interval *seconds*

Syntax Description

seconds	Specifies the number of seconds that a router must wait to receive a hello packet. Dead interval must be the same on neighboring routers (on a specific subnet), but can vary between subnets. This parameter is an unsigned integer ranging from **1** to **65535**.

Command Syntax of the “no” Form

The “no” form of this command sets the dead interval value to the default, 40 seconds:

no ip ospf dead-interval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

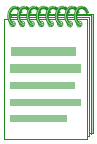
This example shows how to set the dead interval to 20 for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf dead-interval 20
```

13.1.2.11ip ospf authentication-key

Use this command to assign a password to be used by neighboring routers using OSPF's simple password authentication. This password is used as a "key" that is inserted directly into the OSPF header in routing protocol packets. A separate password can be assigned to each OSPF network on a per-interface basis.

ip ospf authentication-key *password*



NOTES: The password key set with this command will only be used when authentication is enabled for an OSPF area using the **area authentication** command described in Section 13.1.2.15.

All neighboring routers on the same network must have the same password configured to be able to exchange OSPF information.

Syntax Description

password	Specifies an OSPF authentication password. Valid values are alphanumeric strings up to 8 bytes in length.

Command Syntax of the "no" Form

The "no" form of this command removes an OSPF authentication password on an interface:

no ip ospf authentication-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

If *password* is not specified, the password will be set to a blank string.

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Example

This example shows how to enables an OSPF authentication key on VLAN 1 with the password "yourpass":

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf authentication-key yourpass
```

13.1.2.12ip ospf message digest key md5

Use this command to enable or disable OSPF MD5 authentication on an interface. This validates OSPF MD5 routing updates between neighboring routers.

ip ospf message-digest-key *keyid* **md5** *key*

Syntax Description

keyid	Specifies the key identifier on the interface where MD5 authentication is enabled. Valid values are integers from **1** to **255**.
key	Specifies a password for MD5 authentication to be used with the *keyid*. Valid values are alphanumeric strings of up to 16 bytes.

Command Syntax of the "no" Form

The "no" form of this command disables MD5 authentication on an interface:

no ip ospf message-digest-key *keyid*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to enable OSPF MD5 authentication on VLAN 1, set the key identifier to 20, and set the password to “passone”:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip ospf message-digest-key 20 md5 passone
```

13.1.2.13distance ospf

Use this command to configure the administrative distance for OSPF routes. If several routes (coming from different protocols) are presented to the Matrix E1 Series Route Table Manager (RTM), the protocol with the lowest administrative distance will be chosen for route installation. By default, OSPF administrative distance is set to 110. The **distance ospf** command can be used to change this value, resetting OSPF’s route preference in relation to other routes as shown in the table below.

Route Source	Default Distance
Connected	0
Static	1
OSPF	110
RIP	120

distance ospf {**external** | **inter-area** | **intra-area**}*weight*

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Syntax Description

external | **inter-area** | **intra-area**	Applies the distance value to external (type 5 and type 7), to inter-area, or to intra-area routes. **NOTE:** The value for intra-area distance must be less than the value for inter-area distance, which must be less than the value for external distance.
weight	Specifies an adminstrative distance for OSPF routes. Valid values are **1** - **255**.

Command Syntax of the "no" Form

The "no" form of this command resets OSPF administrative distance to the default value of 110:

no distance {*weight* | **ospf**]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

If route type is not specified, the distance value will be applied to all OSPF routes.

Example

This example shows how to change the default administrative distance for external OSPF routes to 100:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#distance ospf external 100
```

13.1.2.14area range

Use this command to define the range of addresses to be used by Area Border Routers (ABRs) when they communicate routes to other areas.

area *area-id* **range** *ip_address ip_mask*

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Syntax Description

area-id	Specifies the area at the boundary of which routes are to be summarized.
ip_address	Specifies the common prefix of the summarized networks.
ip_mask	Specifies the length of the common prefix.

Command Syntax of the "no" Form

The "no" form of this command stops the routes from being summarized:

no area *area-id* **range** *ip_address ip_mask*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to define the address range as 172.16.0.0/16 for summarized routes communicated at the boundary of area 0.0.0.0:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 0.0.0.0 range 172.16.0.0 255.255.0.0
```

13.1.2.15area authentication

Use this command to enable or disable authentication for an OSPF area.

area *area-id* **authentication** {**simple** | **message-digest**}

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Syntax Description

area-id	Specifies the OSPF area in which to enable authentication. Valid values are decimal values or IP addresses.
simple	Enables simple text authentication. Simple password authentication allows a password (key) to be configured per area. Routers in the same area that want to participate in the routing domain will have to be configured with the same key.
message-digest	Enables MD5 authentication on the OSPF area indicated by the *area-id*.

Command Syntax of the "no" Form

The "no" form of this command disables authentication for an OSPF area:

no area *area-id* **authentication** {**simple** | **message-digest**}

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to enable MD5 authentication on OSPF area 10.0.0.0:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 10.0.0.0 authentication message-digest
```

13.1.2.16area stub

Use this command to define an OSPF area as a stub area. This is an area that carries no external routes.

area *area-id* **stub** [**no-summary**]

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Syntax Description

area-id	Specifies the stub area. Valid values are decimal values or ip addresses.
no-summary	(Optional) Prevents an Area Border Router (ABR) from sending Link State Advertisements (LSAs) into the stub area. When this parameter is used, it means that all destinations outside of the stub area are represented by means of a default route.

Command Syntax of the "no" Form

The "no" form of this command changes the stub back to a plain area:

no area *area-id* **stub** [**no-summary**]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

If **no-summary** is not specified, the stub area will be able receive LSAs.

Example

The following example shows how to define OSPF area 10 as a stub area:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 10 stub
```

13.1.2.17area default cost

Use this command to set the cost value for the default route that is sent into a stub area by an Area Border Router (ABR). The use of this command is restricted to ABRs attached to stub areas.

area *area-id* **default-cost** *cost*

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Syntax Description

area-id	Specifies the stub area. Valid values are decimal values or IP addresses.
cost	Specifies a cost value for the summary route that is sent into a stub area by default. Valid values are 24-bit numbers, from **0** to **16777215**.

Command Syntax of the "no" Form

The "no" form of this command removes the cost value from the summary route that is sent into the stub area:

no area *area-id* **default-cost**

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set the cost value for stub area 10 to 99:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 10 default-cost 99
```

13.1.2.18area nssa

Use this command to configure an area as a not so stubby area (NSSA). An NSSA allows some external routes represented by external Link State Advertisements (LSAs) to be imported into it. This is in contrast to a stub area that does not allow any external routes. External routes that are not imported into an NSSA can be represented by means of a default route. This configuration is used when an OSPF internetwork is connected to multiple non-OSPF routing domains.

area *area-id* **nssa** [**default-information-originate**]

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Syntax Description

area-id	Specifies the NSSA area. Valid values are decimal values or IP addresses.
default-information-originate	(Optional) Generates a default of Type 7 into the NSSA. This is used when the router is an NSSA ABR.

Command Syntax of the "no" Form

The "no" form of this command changes the NSSA back to a plain area:

no area *area-id* **nssa** [**default-information-originate**]

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

If **default-information-originate** is not specified, no default type will be generated.

Example

This example shows how to configure area 10 as an NSSA area:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 10 nssa default-information-originate
```

13.1.2.19area virtual-link

Use this command to define an OSPF virtual link, which represents a logical connection between the backbone and a non-backbone OSPF area.

area *area_id* **virtual-link** *ip_address*

The options for using this syntax are:

- **area** *area_id* **virtual-link** *ip_address* **authentication-key** *key*
- **area** *area_id* **virtual-link** *ip_address* **dead-interval** *seconds*
- **area** *area_id* **virtual-link** *ip_address* **hello-interval** *seconds*

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- **area** *area_id* **virtual-link** *ip_address* **retransmit-interval** *seconds*
- **area** *area_id* **virtual-link** *ip_address* **transmit-delay** *seconds*

Syntax Description

area-id	Specifies the transit area for the virtual link. Valid values are decimal values or IP addresses. A transit area is an area through which a virtual link is established.
ip_address	Specifies the IP address of the ABR. A virtual link is established from the ABR, where virtual link configuration is taking place.
authentication-key *key*	Specifies a password to be used by neighbor routers. Valid values are alphanumeric strings of up to 8 bytes. Neighbor routers on a network must have the same password.
dead-interval *seconds*	Specifies the number of seconds that the hello packets of a router are not communicated to neighbor routers before the neighbor routers determine that the router sending the hello packet is out of service. This value must be the same for all nodes attached to a certain subnet, and it is a value ranging from **1** to **8192**.
hello-interval *seconds*	Specifies the number of seconds between hello packets on an interface. This value must be the same for all nodes attached to a network and it is a value ranging from **1** to **8192**.
retransmit-interval *seconds*	Specifies the number of seconds between successive retransmissions of the same LSAs. Valid values are greater than the expected amount of time required for the update packet to reach and return from the interface, and range from **1** to **8192**.
transmit-delay *seconds*	Specifies the estimated number of seconds for a link state update packet on the interface to be transmitted. Valid values range from **1** to **8192**.

Command Syntax of the “no” Form

The “no” form of this command removes the virtual link:

no area *area_id* **virtual-link** *ip_address* **authentication-key** *key*

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no area *area_id* **virtual-link** *ip_address* **dead-interval** *seconds*

no area *area_id* **virtual-link** *ip_address* **hello-interval** *seconds*

no area *area_id* **virtual-link** *ip_address* **retransmit-interval** *seconds*

no area *area_id* **virtual-link** *ip_address* **transmit-delay** *seconds*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to configure a virtual link between OSPF area 0.0.0.2 and ABR network 134.141.7.2:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#area 0.0.0.2 virtual-link 134.141.7.2
```

13.1.2.20passive-ospf

Use this command to enable passive OSPF on an interface. This allows an interface to be included in the OSPF route table, but turns off sending and receiving hellos for an interface. It also prevents OSPF adjacencies from being formed on an interface.

passive-ospf vlan *vlan-id*

Syntax Description

vlan *vlan-id*	Specifies the interface on which to enable passive OSPF mode.

Command Syntax of the “no” Form

The “no” form of this command disables passive OSPF mode:

no passive-ospf vlan *vlan-id*

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Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how enable passive OSPF mode on VLAN 102:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#passive-ospf vlan 102
```

13.1.2.21 redistribute

Use this command to allow routing information discovered through non-OSPF protocols to be distributed in OSPF update messages.

redistribute {**connected** | **rip** | **static**}[**metric** *metric value*] [**metric-type** *type-value*] [**subnets**]

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Syntax Description

connected	Specifies that non-OSPF information discovered via directly connected interfaces will be redistributed. These are routes not specified in the OSPF network command as described in Section 13.1.2.2.
rip	Specifies that RIP routing information will be redistributed in OSPF.
static	Specifies that non-OSPF information discovered via static routes will be redistributed. Static routes are those created using the **ip route** command detailed in Section 12.2.5.6.
metric *metric value*	(Optional) Specifies a metric for the connected, RIP or static redistribution route. This value should be consistent with the designation protocol.
metric-type *type value*	(Optional) Specifies the external link type associated with the default connected, RIP or static route advertised into the OSPF routing domain. Valid values are **1** for type 1 external route, and **2** for type 2 external route.
subnets	(Optional) Specifies that connected, RIP or static routes that are subnetted routes will be redistributed.

Command Syntax of the “no” Form

The “no” form of this command clears redistribution parameters:

no redistribute {**connected** | **rip** | **static**}

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

- If *metric value* is not specified, 0 will be applied.
- If *type value* is not specified, type 2 (external route) will be applied.
- If **subnets** is not specified, only non-subnetted routes will be redistributed.

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Example

This example shows how to distribute external type 2 RIP routing information from non-subnetted routes in OSPF updates:

```
Matrix>Router(config)#router ospf
Matrix>Router(config-router)#redistribute rip
```

13.1.2.22database-overflow

Use this command to limit the size of OSPF link state database overflow, a condition where the router is unable to maintain the database in its entirety. Setting database overflow allows you to set a limit on the number of external LSAs. If the limit is exceeded, self-originated external LSAs will be removed so that OSPF can handle the large number of external LSAs coming from another router. When the warning level is set, a Syslog message will be issued when the number of external LSAs has reached the specified level. Every **exit-overflow interval** seconds, the database will be checked and, if the total is less than the limit specified, the self originated external LSAs will be restored.

database-overflow external {[**exit-overflow-interval** *interval*] [**limit** *limit*] [**warning-level** *level*]}

Syntax Description

external	Specifies the LSA type as external (Type 5.)
exit-overflow-interval *interval*	Specifies an interval (in seconds) the OSPF link state database will be checked to determine if the overflow limit has been reached. Valid values are **0** - **86400**. Default is **0**.
limit *limit*	Specifies the peak number of LSAs accepted before overflow occurs. Valid values are **0** - **4000**. Default is **0**. **NOTE:** Limit value must be greater than the warning-level value and set prior to it since all defaults are 0.
warning-level *level*	Specifies the number of LSAs at which a warning of pending overflow will be generated. Valid values are **0** - **4000**. Default is **0**.

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Command Syntax of the "no" Form

The "no" form of this command removes the database overflow limits:

no database-overflow external {[**exit-overflow-interval** *interval*] [**limit** *limit*] [**warning-level** *level*]}

Command Type

Router command.

Command Mode

Router configuration: **Matrix->Router(config-router)#**

Command Defaults

None.

Example

This example shows how to set the OSPF database exit overflow interval to 240 seconds, the overflow limit to 3800 LSAs, and the warning level to 2500 LSAs:

```
Matrix>Router(config)#router ospf 1
Matrix>Router(config-router)#database-overflow external exit-overflow-interval
240
Matrix>Router(config-router)#database-overflow external limit 3800
Matrix>Router(config-router)#database-overflow external warning-level 2500
```

13.1.2.23show ip ospf

Use this command to display OSPF information.

show ip ospf

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

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Command Defaults

None.

Example

This example shows how to display OSPF information:

```
Matrix>Router#show ip ospf
Routing Process "ospf 20 " with ID 134.141.7.2
Supports only single TOS(TOS0) route
It is an area border and autonomous system boundary router
Summary Link update interval is 0 seconds.
External Link update interval is 0 seconds.
Redistributing External Routes from,
Number of areas in this router is 3
Area BACKBONE (0)
    Number of interfaces in this area is 0
    Area has no authentication
    SPF algorithm executed 65 times
    Area ranges are

    Link State Update Interval is 00:30:00 and due in 00:03:12.
    Link State Age Interval is 00:00:00 and due in 00:00:00.

Area 0.0.0.3
    Number of interfaces in this area is 1
    Area has no authentication
    SPF algorithm executed 59 times
    Area ranges are

    Link State Update Interval is 00:30:00 and due in 00:02:28.
    Link State Age Interval is 00:00:00 and due in 00:00:00.

Area 0.0.0.2
    Number of interfaces in this area is 3
    Area has no authentication
    SPF algorithm executed 61 times
    Area ranges are
         140.20.0.0/255.255.0.0

    Link State Update Interval is 00:30:00 and due in 00:03:07.
    Link State Age Interval is 00:00:00 and due in 00:00:00.
```


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13.1.2.24show ip ospf database

Use this command to display the OSPF link state database.

show ip ospf database [*link-state-id*]

The options for using this syntax are:

- **show ip ospf database router** [*link-state-id*]
- **show ip ospf database network** [*link-state-id*]
- **show ip ospf database summary** [*link-state-id*]
- **show ip ospf database asbr-summary** [*link-state-id*]
- **show ip ospf database external** [*link-state-id*]
- **show ip ospf database nssa-external** [*link-state-id*]
- **show ip ospf database database-summary**

Syntax Description

link-state-id	(Optional) Specifies the link state identifier. Valid values are IP addresses.
router	Displays router (Type 1) link state records in their detailed format. Router records are originated by all routers.
network	Displays network (Type 2) link state records in their detailed format. Network records are originated by designated routers.
summary	Displays summary (Type 3) link state records in their original format. Summary records are originated by ABRs.
asbr-summary	Displays Autonomous System Border Router (ASBR) summary (Type 4) link status records in their detail format. ASBR-summary records are originated by ABRs.
external	Displays external (Type 5) link state records. Type 5 link state records in their detailed format.
nssa-external	Displays nssa-external (Type 7) link state records in their detailed format. Type 7 records are originated by ASBRs.
database-summary	Displays a numerical summary of the contents of the link state database.

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Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If *link-state-id* is not specified, the specified type of database records will be displayed for all link state IDs.

Example

This example shows how to display all OSPF link state database information:

```
Matrix>Router#show ip ospf database
OSPF Router with ID(182.127.64.1)

         Displaying Net Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#      Checksum
182.127.63.1    182.127.62.1    956  0x80000001     0xb6ca

         Displaying Router Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#      Checksum LinkCount
182.127.64.1    182.127.64.1    308  0x8000000f     0x636b     2
182.127.62.1    182.127.62.1    952  0x8000001b     0x7ed7     1

         Displaying Summary Net Link States(Area 0.0.0.0)
 LinkID         ADV Router      Age       Seq#      Checksum
182.127.63.1    182.127.62.1    956  0x80000001     0xb6ca
```

Table 13-3 provides an explanation of the command output.

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Table 13-3 show ip ospf database Output Details

Output	What It Displays...
Link ID	Link ID, which varies as a function of the link state record type, as follows: • Net Link States - Shows the interface IP address of the designated router to the broadcast network. • Router Link States - Shows the ID of the router originating the record. • Summary Link States - Shows the summary network prefix.
ADV Router	Router ID of the router originating the link state record.
Age	Age (in seconds) of the link state record.
Seq#	OSPF sequence number assigned to each link state record.
Checksum	Field in the link state record used to verify the contents upon receipt by another router.
LinkCount	Link count of router link state records. This number is equal to, or greater than, the number of active OSPF interfaces on the originating router.

13.1.2.25show ip ospf border-routers

Use this command to display information about OSPF internal entries to Area Border Routers (ABRs) and Autonomous System Boundary Routers (ASBRs).

show ip ospf border-routers

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

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Example

This example shows how to display information about OSPF border routers. The first line of this output shows that an intra-area route has been established to destination border router 192.168.22.1 via neighboring router 192.168.11.1 on the VLAN 2 interface in area 0. The OSPF cost of this route is 64, and it carries an SPF calculation of 10. The destination router is an ABR:

```
Matrix>Router#show ip ospf border-routers
OSPF internal
Codes: i - Intra-area route, I - Inter-area route
i 192.168.22.1 [64] via 192.168.11.1, VLAN2, ABR, Area 0, SPF 10
i 192.168.22.1 [64] via 192.168.11.1, VLAN2, ABR, Area 4, SPF 10
i 192.168.44.1 [64] via 192.168.33.1, VLAN1, ABR, Area 0, SPF 10
i 192.168.44.1 [64] via 192.168.33.1, VLAN1, ABR, Area 2, SPF 7
i 192.168.44.2 [128] via 192.168.33.1, VLAN1, ABR, Area 0, SPF 10
i 192.168.44.2 [128] via 192.168.11.1, VLAN2, ABR, Area 0, SPF 10
```

13.1.2.26show ip ospf interface

Use this command to display OSPF interface related information, including network type, priority, cost, hello interval, and dead interval.

show ip ospf interface [**vlan** *vlan_id*]

Syntax Description

vlan *vlan_id*	(Optional) Displays OSPF information for a specific VLAN. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If *vlan_id* is not specified, OSPF statistics will be displayed for all VLANs.

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Example

This example shows how to display all OSPF related information for VLAN 1:

```
Matrix>Router#show ip ospf interface vlan 1
Vlan  1 is UP
 Internet Address  182.127.63.2  Mask  255.255.255.0,Area 0.0.0.0
 Router ID 182.127.64.1,Network Type BROADCAST,Cost: 10
 Transmit Delay is 1 sec,State BACKUPDR,Priority 1
 Designated Router id 182.127.62.1, Interface addr 182.127.63.1
 Backup Designated Router id 182.127.63.2,
 Timer intervals configured, Hello 10,Dead 40,Wait 40,Retransmit 5
    Neighbor Count is 1, Adjacent neighbor count is 1
  Adjacent with neighbor 182.127.63.1 (Designated Router)
```

Table 13-4 provides an explanation of the command output.

Table 13-4 show ip ospf interface Output Details

Output	What It Displays...
Vlan	Interface (VLAN) administrative status as up or down.
Internet Address	IP address and mask assigned to this interface.
Router ID	Router ID, which OSPF selects from IP addresses configured on this router.
Network Type	OSPF network type, for instance, broadcast.
Cost	OSPF interface cost, which is either default, or assigned with the **ip ospf cost** command. For details, refer to Section 13.1.2.4.
Transmit Delay	The number (in seconds) added to the LSA (Link State Advertisement) age field.
State	The interface state (versus the state between neighbors). Valid values include BACKUPDR (Backup Designated Router), and DR (Designated Router).
Priority	The interface priority value, which is either default, or assigned with the **ip ospf priority** command. For details, refer to Section 13.1.2.5.
Designated Router id	The router ID of the designated router on this subnet, if one exists.
Interface addr	IP address of the designated router on this interface.

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Table 13-4 show ip ospf interface Output Details (Continued)

Output	What It Displays...
Backup Designated Router id	IP address of the backup designated router on this interface, if one exists.
Timer intervals configured	OSPF timer intervals. These are either default, or configured with the **ip ospf retransmit-interval** (Section 13.1.2.7), the **ip ospf hello-interval** (Section 13.1.2.9), and the **ip ospf dead interval** (Section 13.1.2.10) commands. The wait timer represents the amount of time a router waits before initiating a designated router/backup designated router election. The wait timer changes when the dead interval changes. The retransmit timer represents the amount of time between successive transmissions of LSAs (Link State Advertisements) until acknowledgement is received.
Neighbor Count	Number of neighbors over this interface.
Adjacent neighbor count	Number of adjacent (FULL state) neighbors over this interface.
Adjacent with neighbor	IP address of the adjacent neighbor.

13.1.2.27show ip ospf neighbor

Use this command to display the state of communication between an OSPF router and its neighbor routers.

show ip ospf neighbor [**detail**] [*ip_address*] [**vlan** *vlan_id*]

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Syntax Description

detail	(Optional) Displays detailed information about the neighbors, including the area in which they are neighbors, who the designated router/backup designated router is on the subnet, if applicable, and the decimal equivalent of the E-bit value from the hello packet options field.
ip_address	(Optional) Displays OSPF neighbors for a specific IP address.
vlan *vlan_id*	(Optional) Displays OSPF neighbors for a specific VLAN. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

- If **detail** is not specified, summary information will be displayed.
- If *ip_address* is not specified, OSPF neighbors will be displayed for all IP addresses configured for routing.
- If *vlan_id* is not specified, OSPF neighbors will be displayed for all VLANs configured for routing.

Example

This example shows how to use the **show ospf neighbor** command:

```
Matrix>Router#show ip ospf neighbor
ID              Pri    State     Dead-Int  Address       Interface
182.127.62.1      1    FULL      40        182.127.63.1  vlan1
```

Table 13-5 provides an explanation of the command output.

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Table 13-5 show ip ospf neighbor Output Details

Output	What It Displays...
ID	Neighbor's router ID of the OSPF neighbor.
Pri	Neighbor's priority over this interface.
State	Neighbor's OSPF communication state.
Dead-Int	Interval (in seconds) this router will wait without receiving a Hello packet from a neighbor before declaring the neighbor is down.
Address	Neighbor's IP address.
Interface	Neighbor's interface (VLAN).

13.1.2.28show ip ospf virtual-links

Use this command to display information about the virtual links configured on a router. A virtual link represents a logical connection between the backbone and a non-backbone OSPF area.

show ip ospf virtual-links

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

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Example

This example shows how to display OSPF virtual links information:

```
Matrix>Router#show ip ospf virtual-links
Virtual Link to router 5.5.5.1, is UP
 Transit area 0.0.0.2,via interface Vlan 7, Cost of using 10
 Transmit Delay is 1 sec(s), State POINT_TO_POINT
 Timer intervals configured:
                Hello 10, Dead 40, Wait 40, Retransmit 5
 Adjacency State FULL
```

Table 13-6 provides an explanation of the command output.

Table 13-6 show ip ospf virtual links Output Details

Output	What It Displays...
Virtual Link	ID of the virtual link neighbor, and the virtual link status, which is up or down.
Transit area	ID of the transit area through which the virtual link is configured.
via interface	Router's interface into the transit area.
Cost of using	OSPF cost of routing through the virtual link.
Transit Delay	Time (in seconds) added to the LSA (Link State Advertisement) age field when the LSA is transmitted through the virtual link.
State	Interface state assigned to a virtual link, which is point-to-point.
Timer intervals configured	Timer intervals configured for the virtual link, including Hello, Dead, Wait, and Retransmit intervals.
Adjacency State	State of adjacency between this router and the virtual link neighbor of this router.

13.1.2.29clear ip ospf process

Use this command to reset the OSPF process. This will require adjacencies to be reestablished and routes to be reconverged.

clear ip ospf process *process-id*

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Syntax Description

process-id	Specifies the process ID, an internally used identification number for each instance of the OSPF routing process run on a router. Valid values are **1** to **65535**.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

Example

This example shows how to reset OSPF process 1:

```
Matrix>Router#clear ip ospf process 1
```


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13.1.3 Configuring DVMRP

Purpose

To enable and configure the Distance Vector Routing Protocol (DVMRP) on an interface. DVMRP routes multicast traffic using a technique known as Reverse Path Forwarding. When a router receives a packet, it floods the packet out of all paths except the one that leads back to the packet's source. Doing so allows a data stream to reach all VLANs (possibly multiple times). If a router is attached to a set of VLANs that do not want to receive from a particular multicast group, the router can send a "prune" message back up the distribution tree to stop subsequent packets from traveling where there are no members. DVMRP will periodically reflood in order to reach any new hosts that want to receive from a particular group.

Commands

The commands needed to enable and configure DVMRP are listed below and described in the associated section as shown:

- ip dvmrp (Section 13.1.3.1)
- ip dvmrp metric (Section 13.1.3.2)
- show ip dvmrp route (Section 13.1.3.3)
- show ip mroute (Section 13.1.3.4)

13.1.3.1 ip dvmrp

Use this command to enable or disable DVMRP on an interface.

ip dvmrp

Syntax Description

None.

Command Syntax of the "no" Form

The "no" form of this command disables DVMRP:

no ip dvmrp

Command Type

Router command.

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Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to enable DVMRP on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip dvmrp
```

13.1.3.2 ip dvmrp metric

Use this command to configure the metric associated with a set of destinations for DVMRP reports.

ip dvmrp metric *metric*

Syntax Description

metric	Specifies a metric associated with a set of destinations for DVMRP reports. Valid values are from **0** to **31**. Entering a **0** value will reset the metric back to the default value of 1.

NOTE: To reset the DVMRP metric back to the default value of 1, enter **ip dvmrp metric 0**.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to set a DVMRP of 16 on VLAN 1:

```
Matrix>Router(config-if(Vlan 1))#ip dvmrp metric 16
```

13.1.3.3 show ip dvmrp route

Use this command to display DVMRP routing information.

show ip dvmrp route

Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Router#**

Command Defaults

None.

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Example

This example shows how to display DVMRP routing table entries. In this case, the routing table has 5 entries. The first entry shows that the source network 60.1.1.0/24 can be reached via next-hop router 40.1.1.3. This route has a metric of 2. It has been in the DVMRP routing table for 1 hour, 24 minutes and 2 seconds and will expire in 2 minutes and 3 seconds. It supports flag messages for verifying neighbors, pruning, generation ID and netmask in prunes and grafts (VPGN):

```
Matrix>Router#show ip dvmrp route
flag characters used:
-------------
V Neighbor is verified.
P Neighbor supports pruning.
G Neighbor supports generation ID.
N Neighbor supports netmask in prunes and grafts.
S Neighbor supports SNMP.
M Neighbor supports mtrace.
----------------
DVMRP Routing Table - 5 entries
60.1.1.0/24 [2] uptime: 1:24:2, expires: 0:2:3
    via neighbor: 40.1.1.3 version: 3.255  flags: VPGN  gen id:
0x336ff052 50.50.50.0/24 [2] uptime: 1:24:18, expires: 0:1:25
    via neighbor: 30.1.1.1 version: 3.255  flags: VPGN  gen id:
0xaa4ee1fa 40.40.40.0/24 [2] uptime: 1:24:2, expires: 0:2:3
    via neighbor: 40.1.1.3 version: 3.255  flags: VPGN  gen id:
0x336ff052 40.1.1.0/24 [1] uptime: 1:24:8, expires: 0:0:0
    via: local
30.1.1.0/24 [1] uptime: 1:24:20, expires: 0:0:0
    via: local
```

13.1.3.4 show ip mroute

Use this command to display the multicast forwarding cache table. Since the DVMRP routing table is not aware of group membership, the DVMRP process builds a forwarding cache table based on a combination of information. This information includes items from the multicast routing table, such at the source network/mask and upstream neighbors. Other items used to build the forwarding cache table are source groups, received pruned neighbors and VLANs, upstream and downstream VLANs, and other information, The forwarding cache table represents the local router's understanding of the shortest path source-based delivery tree for each (source, group) pair. Basically it is the source's RPM (Reverse-Path Multicast) for that group.

show ip mroute

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Syntax Description

None.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

None.

Example

This example shows how to display the multicast forwarding cache table. In this case, it shows there are two source multicast networks. The network at IP address 165.223.129.0 is in multicast group 224.2.164.189. It recognizes an upstream neighbor at 134.141.20.1 via the VLAN 20 interface, and two downstream VLANs. The other multicast network at IP address 134.141.30.0 is in multicast group 238.27.2.2. It recognizes the same upstream neighbor via the same interface, and four downstream VLANs. The table shows that two VLANs have asked to be pruned from this multicast distribution route:

```
Matrix>Router#show ip mroute
Active IP Multicast Sources
Flags: D - Dense, S - Sparse, C - Connected, L - Local,
P - Pruned, R - RP-bit set, F - Register flag, T - SPT-bit set,
Outgoing interface flags: H - Hardware switched
Timers: Uptime/Expires
Interface state: Interface, Next-Hop or VCD, State/Mode

Source Network: 165.223.129.0       Source Mask: 255.255.255.0
Multicast Group: 224.2.164.189      Uptime: 10:49:20
Upstream Neighbor:  134.141.20.1    Upstream Vlan: 20
                                    Downstream Vlans:   22,122

Pruned Neighbor        Pruned Vlan         Expires
134.141.36.2               36              1:10:40

134.141.70.1               70              0:18:46

Source Network: 134.141.30.0        Source Mask: 255.255.255.0
Multicast Group: 238.27.2.2         Uptime: 19:58:1
Upstream Neighbor:  134.141.20.1    Upstream Vlan: 20
                                    Downstream Vlans:   22,36,51,70
```


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13.1.4 Configuring IRDP

Purpose

To enable and configure the ICMP Router Discovery Protocol (IRDP) on an interface. This protocol enables a host to determine the address of a router it can use as a default gateway.

Commands

The commands needed to enable and configure IRDP are listed below and described in the associated section as shown:

- ip irdp (Section 13.1.4.1)
- ip irdp maxadvertinterval (Section 13.1.4.2)
- ip irdp minadvertinterval (Section 13.1.4.3)
- ip irdp holdtime (Section 13.1.4.4)
- ip irdp preference (Section 13.1.4.5)
- ip irdp address (Section 13.1.4.6)
- no ip irdp multicast (Section 13.1.4.7)
- show ip irdp (Section 13.1.4.8)

13.1.4.1 ip irdp

Use this command to enable or disable IRDP on an interface.

ip irdp

Syntax Description

None.

Command Syntax of the “no” Form

The “no” form of this command disables IRDP on an interface:

no ip irdp

Command Type

Router command.

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Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to enable IRDP on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp
```

13.1.4.2 ip irdp maxadvertinterval

Use this command to set the maximum interval in seconds between IRDP advertisements.

ip irdp maxadvertinterval *interval*

Syntax Description

interval	Specifies a maximum advertisement interval in seconds. Valid values are **4** to **1800**.

Command Syntax of the "no" Form

The "no" form of this command resets the maximum advertisement interval to the default value of **600** seconds:

no irdp maxadvertinterval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

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Example

This example shows how to set the maximum IRDP advertisement interval to 1000 seconds on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp maxadvertinterval 1000
```

13.1.4.3 ip irdp minadvertinterval

Use this command to set the minimum interval in seconds between IRDP advertisements.

ip irdp minadvertinterval *interval*

Syntax Description

interval	Specifies a minimum advertisement interval in seconds. Valid values are **3** to **1800**.

Command Syntax of the "no" Form

The "no" form of this command deletes the custom holdtime setting and resets the minimum advertisement interval to the default value of three-fourths of the **maxadvertinterval** value:

no irdp minadvertinterval

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the minimum IRDP advertisement interval to 500 seconds on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp minadvertinterval 500
```


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13.1.4.4 ip irdp holdtime

Use this command to set the length of time in seconds IRDP advertisements are held valid.

ip irdp holdtime *holdtime*

NOTE: Hold time is automatically set at three times the **maxadvertinterval** value when the maximum advertisement interval is set as described in Section 13.1.4.2 and the minimum advertisement interval is set as described in Section 13.1.4.3.

Syntax Description

holdtime	Specifies the hold time in seconds. Valid values are **0** to **9000**.

Command Syntax of the "no" Form

The "no" form of this command resets the hold time to the default value of three times the **maxadvertinterval** value:

no irdp holdtime

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the IRDP hold time to 4000 seconds on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp holdtime 4000
```


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13.1.4.5 ip irdp preference

Use this command to set the IRDP preference value for an interface. This value is used by IRDP to determine the interface's selection as a default gateway address.

ip irdp preference *preference*

Syntax Description

preference	Specifies the value to indicate the interface's use as a default router address. Valid values are **-2147483648** to **2147483647**. The value of **80000000** indicates that the address, even though it may be advertised, is not to be used by neighboring hosts as a default router address.

Command Syntax of the "no" Form

The "no" form of this command resets the interface's IRDP preference value to the default of **0**:

no irdp preference

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the IRDP preference value to 80000000 seconds on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp preference 80000000
```


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13.1.4.6 ip irdp address

Use this command to add additional IP addresses for IRDP to advertise.

ip irdp address *ip_address preference*

Syntax Description

ip_address	Specifies an IP address to advertise.
preference	Specifies the value to indicate the address' use as a default router address. Valid values are **-2147483648** to **2147483647**. The value of **80000000** indicates that the address, even though it may be advertised, is not to be used by neighboring hosts as a default router address.

Command Syntax of the "no" Form

The "no" form of this command clears an IP address from being advertised:

no ip irdp preference *ip_address*

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to advertise IP address 183.255.0.162 with a preference of 1 on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip irdp address 183.255.0.162 1
```

13.1.4.7 no ip irdp multicast

Use this command to enable the router to send IRDP advertisements using broadcast rather than multicast transmissions. By default, the router sends IRDP advertisements via multicast.

no ip irdp multicast

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Syntax Description

None.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to enable the router to send IRDP advertisements using broadcast:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#no ip irdp multicast
```

13.1.4.8 show ip irdp

Use this command to display IRDP information.

show ip irdp [**vlan** *vlan_id*]

Syntax Description

vlan *vlan_id*	(Optional) Displays IRDP information for a specific VLAN. This VLAN must be configured for IP routing as described in Section 3.3.2.

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

If **vlan** *vlan_id* is not specified, IRDP information for all interfaces will be displayed.

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Example

This example shows how to display IRDP information for VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(vlan 1))#show ip irdp vlan 1
Interface 1 is not enabled
```


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13.1.5 Configuring VRRP

Purpose

To enable and configure the Virtual Router Redundancy Protocol (VRRP). This protocol eliminates the single point of failure inherent in the static default routed environment by transferring the responsibility from one router to another if the original router goes down. VRRP-enabled routers decide who will become master and who will become backup in the event the master fails.

Commands

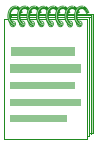
The commands needed to enable and configure VRRP are listed below and described in the associated section as shown:

- router vrrp (Section 13.1.5.1)
- create (Section 13.1.5.2)
- address (Section 13.1.5.3)
- priority (Section 13.1.5.4)
- advertise-interval (Section 13.1.5.5)
- critical-ip (Section 13.1.5.6)
- preempt (Section 13.1.5.7)
- enable (Section 13.1.5.8)
- ip vrrp authentication-key (Section 13.1.5.9)
- ip vrrp message-digest-key (Section 13.1.5.10)
- show ip vrrp (Section 13.1.5.11)

13.1.5.1 router vrrp

Use this command to enable or disable VRRP configuration mode.

router vrrp



NOTE: You must execute the **router vrrp** command to enable the protocol before completing other VRRP-specific configuration tasks. For details on enabling configuration modes, refer to Table 3-10 in Section 3.3.3.

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Syntax Description

None.

Command Syntax of the “no” Form

The “no” form of this command removes all VRRP configurations from the running configuration:

no router vrrp

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how enable VRRP configuration mode:

```
Matrix>Router#configure terminal
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#
```

13.1.5.2 create

Use this command to create a VRRP session.

create vlan *vlan_id vrid*

NOTE: This command must be executed to create an instance of VRRP on a routing interface (VLAN) before any other VRRP settings can be configured.

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Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to create a VRRP session. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) to associate with the routing interface. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables the VRRP session:

no create vlan *vlan_id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to create a VRRP session on VLAN 1 with a VRID of 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#create vlan 1 1
```

13.1.5.3 address

Use this command to configure a virtual router IP address. If the virtual router IP address is the same as the interface (VLAN) address owned by a VRRP router, then the router owning the address becomes the master. The master sends an advertisement to all other VRRP routers declaring its status and assumes responsibility for forwarding packets associated with its virtual router ID (VRID). If the virtual router IP address is not owned by any of the VRRP routers, then the routers compare their priorities and the higher priority owner becomes the master. If priority values are the same, then the VRRP router with the higher IP address is selected master. For details on using the **priority** command, refer to Section 13.1.5.4.

address vlan *vlan_id vrid ip_address owner*

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Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to configure a virtual router address. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
ip_address	Specifies the virtual router IP address to associate with the router.
owner	Specifies a value to indicate if the router owns the IP address as one of its interfaces. Valid values are: • **1** to indicate the router owns the address. • **0** to indicate the router does not own the address.

Command Syntax of the "no" Form

The "no" form of this command clears the VRRP address configuration:

no address vlan *vlan_id vrid ip_address owner*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how to configure a virtual router address of 182.127.62.1 on VLAN 1, VRID 1, and to set the router connected to the VLAN via this interface as the master:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#address vlan 1 1 182.127.62.1 1
```

13.1.5.4 priority

Use this command to set a priority value for a VRRP router.

priority vlan *vlan_id vrid priority_value*

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Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to configure VRRP priority. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
priority_value	Specifies the VRRP priority value to associate with the *vrid*. Valid values are from **1** to **254**, with the highest value setting the highest priority. Priority value of **255** is reserved for the VRRP router that owns the IP address associated with the virtual router. Priority **0** is reserved for signaling that the master has stopped working and the backup router must transition to master state.

Command Syntax of the "no" Form

The "no" form of this command clears the VRRP priority configuration:

no priority vlan *vlan_id vrid priority_value*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

Example

This example shows how set a VRRP priority of 200 on VLAN 1, VRID 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#priority vlan 1 1 200
```


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13.1.5.5 advertise-interval

Use this command to set the interval in seconds between VRRP advertisements. These are sent by the master router to other routers participating in the VRRP master selection process, informing them of its configured values. Once the master is selected, then advertisements are sent every advertising interval to let other VRRP routers in this VLAN/VRID know the router is still acting as master of the VLAN/VRID.

advertise-interval vlan *vlan_id vrid interval*

NOTE: All routers with the same VRID should be configured with the same advertisement interval.

Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to configure the VRRP advertisement interval. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
interval	Specifies a VRRP advertisement interval to associate with the *vrid*. Valid values are from **1** to **255** seconds.

Command Syntax of the “no” Form

The “no” form of this command clears the VRRP advertise interval value:

no advertise-interval vlan *vlan_id vrid interval*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

This example shows how set an advertise interval of 3 seconds on VLAN 1, VRID 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#advertise-interval vlan 1 1 3
```

13.1.5.6 critical-ip

Use this command to set a critical IP address for VRRP routing. The critical IP address defines an interface — in addition to the interface between hosts and a first-hop router — that will prevent the master router from functioning properly if the interface were to fail. For example, an IP address of an interface connecting a master router to a router configured for internet access would be considered a critical IP address for VRRP routing.

critical-ip vlan *vlan_id vrid ip_address*

Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to set the critical IP address. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.
ip_address	Specifies the IP address to set as the critical IP address.

Command Syntax of the "no" Form

The "no" form of this command clears the critical IP address:

no critical-ip vlan *vlan_id vrid ip_address*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

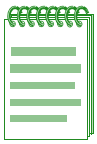
This example shows how to set IP address 182.127.62.3 as a critical IP address associated with VLAN 1, VRID 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#critical-ip vlan 1 1 182.127.62.3
```

13.1.5.7 preempt

Use this command to enable or disable preempt mode on a VRRP router. Preempt is enabled on VRRP routers by default, which allows a higher priority backup router to preempt a lower priority master.

preempt *vlan_id vrid*



NOTE: The router that owns the virtual router IP address always preempts other routers, regardless of this setting.

Syntax Description

vlan_id	Specifies the number of the VLAN on which to set preempt mode. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies a unique Virtual Router ID (VRID) associated with the routing interface. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables preempt mode:

no preempt *vlan_id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

This example shows how to disable preempt mode on VLAN 1, VRID 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#no preempt vlan 1 1
```

13.1.5.8 enable

Use this command to enable VRRP on an interface.

enable vlan *vlan_id vrid*

NOTE: Before enabling VRRP, you must set the other options described in this section. Once enabled, you cannot make any configuration changes to VRRP without first disabling it using the **no enable vlan** command.

Syntax Description

vlan *vlan_id*	Specifies the number of the VLAN on which to enable VRRP. This VLAN must be configured for IP routing as described in Section 3.3.2.
vrid	Specifies the Virtual Router ID (VRID) associated with the *vlan_id*. Valid values are from **1** to **255**.

Command Syntax of the "no" Form

The "no" form of this command disables VRRP on an interface:

no enable vlan *vlan_id vrid*

Command Type

Router command.

Command Mode

Router configuration: **Matrix>Router(config-router)#**

Command Defaults

None.

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Example

This example shows how to enable VRRP on VLAN 1, VRID 1:

```
Matrix>Router(config)#router vrrp
Matrix>Router(config-router)#enable vlan 1 1
```

13.1.5.9 ip vrrp authentication-key

Use this command to set a VRRP authentication password on an interface.

ip vrrp authentication-key *password*

Syntax Description

password	Specifies an authentication password. Text string can be 1 to 8 characters in length.

Command Syntax of the "no" Form

The "no" form of this command clears VRRP authentication:

no ip vrrp authentication-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

Command Defaults

None.

Example

This example shows how to set the VRRP authentication password to "vrrpkey" on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip vrrp authentication-key vrrpkey
```

13.1.5.10ip vrrp message-digest-key

Use this command to set a VRRP MD5 authentication password on an interface.

ip vrrp message-digest-key md5 *password*

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Syntax Description

md5	Specifies the authentication type as MD5.
password	Specifies an MD5 authentication password. Text string can be 1 to 16 characters in length.

Command Syntax of the "no" Form

The "no" form of this command clears VRRP MD5 authentication:

no ip vrrp message-digest-key

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router1(config-if(Vlan 1))#**

Command Defaults

None.

Example

This example shows how to set the VRRP MD5 authentication password to "qwer" on VLAN 1:

```
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip vrrp message-digest-key md5 qwer
```

13.1.5.11show ip vrrp

Use this command to display VRRP routing information.

show ip vrrp

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

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Command Defaults

None.

Example

This example shows how to display VRRP information:

```
Matrix>Router(config)#show ip vrrp

-----------VRRP CONFIGURATION-----------
Vlan    Vrid        State          Owner     AssocIpAddr
  1       1      Master           1         182.127.63.1
```


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14

Security Configuration

This chapter describes the Security Configuration set of commands and how to use them.

14.1 OVERVIEW OF SECURITY METHODS

The following security methods are available for controlling which users are allowed to access, monitor, and manage the device.

- Login Security Password – used to log in to the CLI via a Telnet connection or local COM port connection. For details, refer to Section 3.2.1.
- SNMP – allows access to the Matrix E1 device via a network SNMP management application. The level of management access is dependent on the SNMP user or community name and the associated access policy. For details, refer to Chapter 5.
- Host Access Control Authentication (HACA) – authenticates user access of Telnet management, console local management and WebView via a central RADIUS Client/Server application. For an overview on working with HACA, refer to Section 14.4.1. For details, on using CLI commands to configure HACA/RADIUS, refer to Section 14.3.1.
- 802.1X Port Based Network Access Control using EAPOL (Extensible Authentication Protocol Over LANs) - provides a mechanism via a RADIUS server for administrators to securely authenticate and grant appropriate access to end user devices directly attached to Matrix E1 device ports. For an overview on working with 802.1X, refer to Section 14.4.2. For details on using CLI commands to configure 802.1X, refer to Section 14.3.2.
- MAC Authentication – provides a mechanism for administrators to securely authenticate source MAC addresses and grant appropriate access to end user devices directly attached to Matrix E1 device ports. For an overview on working with MAC authentication, refer to Section 14.4.3. For details on using CLI commands to configure MAC authentication, refer to Section 14.3.3.
- MAC Locking – locks a port to one or more MAC addresses, preventing connection of unauthorized devices via the port. For details, refer to Section 14.3.4.

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- Port Web Authentication (PWA) – locks down a port a user is attached to until after the user logs in using a web browser to access the switch. The switch will pass all login information from the end station to a RADIUS server for authentication before turning the port on. PWA is an alternative to 802.1X and MAC authentication. For details, refer to Section 14.3.5.
- Secure Shell (SSH) – permits or denies remote access based on IP address, ciphers and MAC algorithms. For details, refer to Section 14.3.6.
- Access Lists (ACLs) – permits or denies access to routing interfaces based on protocol and source IP address restrictions configured in access lists. For details, refer to Section 14.3.7.
- Denial of Service (DoS) Prevention - prevents Denial of Service attacks, including land, fragmented and large ICMP packets, spoofed address attacks, and UDP/TCP port scanning. For details, refer to Section 14.3.8.
- Flow Setup Throttling (FST) - prevents the effects of DoS attacks by limiting the number of new or established flows that can be programmed on any individual switch port. For details, refer to Section 14.3.9.

14.2 PROCESS OVERVIEW: SECURITY CONFIGURATION

Use the following steps as a guide to configuring security methods on the device:

1. Configuring RADIUS (Section 14.3.1)
2. Configuring EAPOL (Section 14.3.2)
3. Configuring MAC Authentication (Section 14.3.3)
4. Configuring MAC Locking (Section 14.3.4)
5. Configuring Port Web Authentication (Section 14.3.5)
6. Configuring Secure Shell (SSH) (Section 14.3.6)
7. Configuring Access Lists (ACLs) (Section 14.3.7)
8. Configuring Denial of Service (DoS) Prevention (Section 14.3.8)
9. Configuring Flow Setup Throttling (FST) (Section 14.3.9)

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14.3 SECURITY CONFIGURATION COMMAND SET

14.3.1 Configuring RADIUS

Purpose

To perform the following:

- Review the RADIUS client/server configuration on the device.
- Enable or disable the RADIUS client.
- Set local and remote login options.
- Set primary and secondary server parameters, including IP address, timeout period, and number of user login attempts allowed.
- Reset RADIUS server settings to default values.
- Configure a RADIUS accounting server.

Commands

The commands needed to review and configure RADIUS are listed below and described in the associated section as shown:

- show radius (Section 14.3.1.1)
- set radius (Section 14.3.1.2)
- clear radius (Section 14.3.1.3)
- show radius accounting (Section 14.3.1.4)
- set radius accounting (Section 14.3.1.5)
- clear radius accounting (Section 14.3.1.6)

For an overview on working with Host Access Control Authentication (HACA), refer to Section 14.4.1.

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14.3.1.1 show radius

Use this command to display the current RADIUS client/server configuration.

show radius [**last-resort-action**] [**retries**] [**server** [*index*]] [**timeout**]

Syntax Description

last-resort-action	(Optional) Displays last resort action settings. This is the action to be taken if the RADIUS server times out during local or remote login.
retries	(Optional) Displays the maximum number of attempts a user can contact the RADIUS server before timing out.
server *index*	(Optional) Displays all or a specific server configuration.
timeout	(Optional) Displays the maximum amount of time (in seconds) to establish contact with the RADIUS server before timing out.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all RADIUS configuration information will be displayed.

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Example

This example shows how to display RADIUS configuration information:

```
Matrix>show radius
RADIUS status:          Disabled
RADIUS retries:         3
RADIUS timeout:         20 seconds
RADIUS mgmt-auth status: Disabled

Server     Server
Index        IP            Auth-Port        Status
-------------------------------------------------
100         1.2.100.2      1812             Primary

RADIUS last-resort-action    Status
-------------------------    ------
Local                        Challenge
Remote                       Challenge
```

Table 14-1 provides an explanation of the command output.

Table 14-1 show radius Output Details

Output	What It Displays...
RADIUS status	Whether RADIUS is **enabled** or **disabled**.
RADIUS retries	Maximum number of attempts a user can contact the RADIUS server before timing out. The default value of **3** can be reset using the **set radius** command as described in Section 14.3.1.2.
RADIUS timeout	Maximum amount of time (in seconds) to establish contact with the RADIUS server before timing out. The default value of **20** can be reset using the **set radius** command as described in Section 14.3.1.2.
RADIUS mgmt-auth status	Whether RADIUS login authentication is enabled or disabled on management sessions. Default state of enabled can be changed using the **set radius** command as described in Section 14.3.1.2.
Server Index	Index assigned to the RADIUS server. The Matrix E1 Series device allows for up to 10 RADIUS servers to be configured, with up to 2 active at any given time.

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Table 14-1 show radius Output Details (Continued)

Output	What It Displays...
Server IP	IP address of the RADIUS server.
Auth-Port	RADIUS server's UDP authentication port.
Status	Whether the server is the **primary** or **secondary** RADIUS server.
RADIUS last-resort-action	Last resort action to be taken if the RADIUS server times out during local or remote login. Possible actions are: **Accept** (allows access), **Reject** (doesn't allow access) and **Challenge** (prompts for local password).

14.3.1.2 set radius

Use this command to enable, disable, or configure RADIUS authentication.

set radius {**enable** | **disable** | **last-resort-action** {**local** {**accept** | **reject** | **challenge**} | **remote** {**accept** | **reject** | **challenge**}} | **retries** *number-of-retries* | **server** *index ip_address port server-secret* | **timeout** *timeout-value* | **mgmt-auth** {**enable** | **disable**}}

Syntax Description

enable | **disable**	Enables or disables the RADIUS client.
last-resort-action	Sets the action to be taken if the RADIUS server times out during login.
local	Sets last-resort-action options for local (console port) access.
remote	Sets last-resort-action options for remote (Telnet or WebView) access.
accept	Allows access (via console port for local access, Telnet or WebView for remote access) at the Read-Write level with no further attempt at authentication.
reject	Does not allow access.
challenge	Reverts to local passwords.

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retries *number-of-retries*	Specifies the maximum number of attempts to contact the RADIUS server before timing out. Valid values are from **1** - **2147483647**. Default is **3**.
server *index ip_address port server-secret*	Specifies the server's: • index number (**1** - **2147483647)** • IP address • UDP authentication port (**0** - **65535)** • *server-secret* (Read-Write password to access this server. Device will prompt for this entry upon creating a server instance, as shown in the example below.)
timeout *timeout_value*	Specifies the maximum amount of time (in seconds) to establish contact with the RADIUS server before timing out. Valid values are from **1** - **2147483647**. Default is **20** seconds.
mgmt-auth enable | disable	Enables or disables RADIUS login authentication on management sessions. With RADIUS client enabled and **mgmt-auth** enabled (the default state), users will not be allowed to login via console or Telnet using their pre-configured Read-Write (rw) passwords. **NOTE:** RADIUS client must be enabled in order for management authentication to be enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

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Examples

This example shows how to enable the RADIUS client for authenticating with a RADIUS server 1 at IP address 10.1.6.203, UDP authentication port 1812. As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS server:

```
Matrix>set radius server 1 10.1.6.203 1812
 Server Secret:******
 Retype Server Secret:******
 Warning: rfc2138 recommends secret minimum length of 16
```

This example shows how to set the RADIUS timeout to 5 seconds:

```
Matrix>set radius timeout 5
```

This example shows how to set RADIUS retries to 10:

```
Matrix>set radius retries 10
```

14.3.1.3 clear radius

Use this command to reset RADIUS server settings to default values.

clear radius {[**last-resort-action** [**local** | **remote**]] [**retries**] [**server** {*index* | **all**}] [**timeout**]}

Syntax Description

last-resort-action local | **remote**	Resets the last resort local and/or remote action to **Challenge**.
retries	Resets the maximum number of attempts a user can contact the RADIUS server before timing out to **3**.
server *index* | **all**	Resets a specific or all RADIUS server configurations.
timeout	Resets the maximum amount of time to establish contact with the RADIUS server before timing out to **20** seconds.

Command Type

Switch command.

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Command Mode

Read-Write.

Command Defaults

If **local** or **remote** are not specified, all last resort actions will be reset.

Examples

This example shows how to reset configurations on all RADIUS servers:

```
Matrix>clear radius server all
```

This example shows how to reset the RADIUS timeout to the default value of 20 seconds:

```
Matrix>clear radius timeout
```


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14.3.1.4 show radius accounting

Use this command to display the RADIUS accounting configuration. This transmits accounting information between a network access server and a shared accounting server.

show radius accounting [**server** [*index*] | **counter** [*index*] | **retries** [*index*] | **timeout** [*index*] | **intervalminimum** | **updateinterval**]

Syntax Description

server *index*	(Optional) Displays one or all RADIUS accounting server configurations.
counter *index*	(Optional) Displays counters for one or all active RADIUS accounting servers.
retries	(Optional) Displays the maximum number of attempts to contact the RADIUS accounting server before timing out.
timeout	(Optional) Displays the maximum amount of time (in seconds) to establish contact with the RADIUS accounting server before timing out.
intervalminimum	(Optional) Displays the minimum update interval setting. This controls the frequency of RADIUS accounting updates.
updateinterval	(Optional) Displays the number of seconds between each RADIUS accounting interim update (when accumulated accounting data is sent to the server for a session.)

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, all RADIUS accounting configuration information will be displayed.

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Example

This example shows how to display RADIUS accounting configuration information. In this case, RADIUS accounting is not currently enabled and global default settings have not been changed. One server has been configured. The Matrix E1 Series device allows for up to 10 RADIUS accounting servers to be configured, with up to 2 active at any given time.

For details on enabling and configuring RADIUS accounting, refer to Section 14.3.1.5:

```
Matrix>show radius accounting
Accounting status:     Disabled
Accounting update interval:    1800 secs
Accounting interval minimum:   600 secs

Server        Server          Acct
Index           IP            Port  Retries  Timeout     Status
-------------------------------------------------------------------
1           1.1.1.1           1236     2        5        Primary
```


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14.3.1.5 set radius accounting

Use this command to configure RADIUS accounting.

set radius accounting {[**enable**] [**disable**] [**server** *index ip_address port server-secret*] [**retries** *retries index*] [**timeout** *timeout index*] [**intervalminimum** *value*] [**updateinterval** *value*]}

Syntax Description

enable | **disable**	Enables or disables the RADIUS accounting client.
server *index ip_address port server-secret*	Specifies the accounting server's: • index number (**1 - 2147483647)** • IP address • UDP authentication port (**0 - 65535)** • *server-secret* (Read-Write password to access this accounting server. Device will prompt for this entry upon creating a server instance, as shown in the example below.)
retries *retries index*	Sets the maximum number of attempts to contact a specified RADIUS accounting server before timing out. Valid retry values are **1 - 2147483647**.
timeout *timeout index*	Sets the maximum amount of time (in seconds) to establish contact with a specified RADIUS accounting server before timing out. Valid timeout values are **1 - 2147483647**.
intervalminimum *value*	Sets the minimum interval at which RADIUS accounting will send interim updates. Valid values are **60 - 2147483647**.
updateinterval *value*	Sets the number of seconds between each RADIUS accounting interim update (when accumulated accounting data is sent to the server for a session.) Valid values are **180 - 2147483647**.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Examples

This example shows how to enable the RADIUS accounting client for authenticating with accounting server 1 at IP address 10.2.4.12, UDP authentication port 1800. As previously noted, the "server secret" password entered here must match that already configured as the Read-Write (rw) password on the RADIUS accounting server:

```
Matrix>set radius accounting server 1 10.2.4.12 1800
 Server Secret:******
 Retype Server Secret:******
 Make This Entry Active (y/n)? y
 Warning: rfc2138 recommends secret minimum length of 16
```

This example shows how to set the RADIUS accounting timeout to 30 seconds on server 6:

```
Matrix>set radius accounting timeout 30 6
```

This example shows how to set RADIUS accounting retries to 10 on server 6:

```
Matrix>set radius accounting retries 10 6
```


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14.3.1.6 clear radius accounting

Use this command to clear RADIUS accounting configuration settings.

clear radius accounting {[**server**{*index* | **all**}] [**counter**{*index* | **all**}] [**retries** {*index* | **all**}] [**timeout** {*index* | **all**}] [**intervalminimum**] [**updateinterval**]}

Syntax Description

server *index* | **all**	Clears the configuration on one or more accounting servers.
counter *index* | **all**	Clears counters on one or more accounting servers.
retries *index* | **all**	Resets the retries to the default value of 2 on one or more accounting servers.
timeout *index* | **all**	Resets the timeout to 5 seconds on one or more accounting servers.
intervalminimum	Resets the minimum interval to 600 seconds.
updateinterval	Resets the update interval to 1800 seconds.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset the RADIUS accounting timeout to 5 seconds on all servers:

```
Matrix>clear radius accounting timeout all
```


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14.3.2 Configuring 802.1X Authentication

Purpose

To review and configure 802.1X authentication for one or more ports using EAPOL (Extensible Authentication Protocol Over LANs). 802.1X controls network access by enforcing user authorization on selected ports, which results in allowing or denying network access according to user profiles on the RADIUS server.

NOTES: When both 802.1X and MAC authentication are enabled on the same device, the switch enforces a precedence relationship between MAC authentication and 802.1X methods. For more information on these precedence rules, refer to Section 14.4.3.2.

In addition to the EAPOL commands described in this section, Matrix E1 (1G58x-09 and 1H582-xx) devices with firmware versions 3.xx.xx and higher also support a **dot1x** command set for enabling and configuring 802.1X authentication. The **dot1x** commands that can be used alternatively to **eapol** commands are noted in the appropriate sections under the heading “Command Alternative (v3.xx.xx and higher)”.

Commands

The commands needed to review and configure 802.1X are listed below and described in the associated section as shown:

- show dot1x (Section 14.3.2.1)
- show dot1x auth-config (Section 14.3.2.4)
- set dot1x (Section 14.3.2.3)
- set dot1x auth-config (Section 14.3.2.4)
- set dot1x port (Section 14.3.2.5)
- clear dot1x auth-config (Section 14.3.2.6)
- show eapol (Section 14.3.2.7)
- set eapol (Section 14.3.2.8)

For an overview on 802.1X port-based authentication, refer to Section 14.4.2.

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14.3.2.1 show dot1x

Use this command to display 802.1X status, diagnostics, statistics, and reauthentication or initialization control information for one or more port access entity (PAE) ports.

show dot1x [**auth-diag**] [**auth-session-stats**] [**auth-stats**] [*port-string*]

Syntax Description

auth-config	(Optional) Displays authentication configuration information.
auth-diag	(Optional) Displays authentication diagnostics information.
auth-session-stats	(Optional) Displays authentication session statistics.
auth-stats	(Optional) Displays authentication statistics.
port-string	(Optional) Displays information for specific PAE port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

- If no parameters are specified, 802.1X status will be displayed.
- If *port-string* is not specified, authentication information for all ports will be displayed.

Examples

This example shows how to display 802.1X status:

```
Matrix>show dot1x
DOT1X is disabled.
```


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This example shows how to display authentication diagnostics information for Fast Ethernet front panel port 1:

```
Matrix>show dot1x auth-diag fe.0.1

 Port: 1     Auth-Diag:
 Enter Connecting:                    0
 EAP Logoffs While Connecting:        0
 Enter Authenticating:                0
 Success While Authenticating:        0
 Timeouts While Authenticating:       0
 Fail While Authenticating:           0
 ReAuths While Authenticating:        0
 EAP Starts While Authenticating:     0
 EAP Logoff While Authenticating:     0
 ReAuths While Authenticated:         0
 EAP Starts While Authenticated:      0
 EAP Logoff While Authenticated:      0
 Backend Responses:                   0
 Backend Access Challenges:           0
 Backend Other Requests To Supp:      0
 Backend NonNak Responses From Supp:  0
 Backend Auth Successes:              0
 Backend Auth Fails:                  0
```

This example shows how to display authentication session statistics for Fast Ethernet front panel port 1:

```
Matrix>show dot1x auth-session-stats fe.0.1

 Port: 1     Auth-Session-Stats:
 Session Octets Rx:         0
 Session Octets Tx:         0
 Session Frames Rx:         0
 Session Frames Tx:         0
 Session Id:                (1, 00-00-00-00-00-00)
 Session Authentic Method: Remote Auth Server
 Session Time:              0 secs
 Session Terminate Cause:  Port Failure
 Session UserName:
```


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This example shows how to display authentication statistics for Fast Ethernet front panel port 1:

```
Matrix>show dot1x auth-stats fe.0.1

 Port: 1     Auth-Stats:
 EAPOL Frames Rx:           0
 EAPOL Frames Tx:            0
 EAPOL Start Frames Rx:      0
 EAPOL Logoff Frames Rx:     0
 EAPOL RespId Frames Rx:     0
 EAPOL Resp Frames Rx:       0
 EAPOL ReqId Frames Tx:      0
 EAPOL Req Frames Tx:        0
 Invalid EAPOL Frames Rx:    0
 EAP Length Error Frames Rx: 0
 Last EAPOL Frame Version:   0
 Last EAPOL Frame Source:    0:0:0:0:0:0
```


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14.3.2.2 show dot1x auth-config

Use this command to display 802.1X authentication configuration settings for one or more ports.

show dot1x auth-config [**authcontrolled-portcontrol**] [**keytxenabled**] [**maxreq**] [**quietperiod**] [**reauthenabled**] [**reauthperiod**] [**servertimeout**] [**supptimeout**] [**txperiod**] [*port-string*]

Syntax Description

authcontrolled-portcontrol	(Optional) Displays the EAPOL port control mode.
keytxenabled	(Optional) Displays the state of 802.1X key transmission.
maxreq	(Optional) Displays the value set for maximum requests.
quietperiod	(Optional) Displays the value set for quiet period.
reauthenabled	(Optional) Displays the state of reauthentication control.
reauthperiod	(Optional) Displays the value set for reauthentication period.
servertimeout	(Optional) Displays the server timeout value.
supptimeout	(Optional) Displays the authentication supplicant timeout value.
txperiod	(Optional) Displays the transmission period value.
port-string	(Optional) Displays information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Only.

Command Alternative (v3.xx.xx and higher)

- **show eapol** (Section 14.3.2.7)

Command Defaults

- If no parameters are specified, all 802.1X settings will be displayed.
- If *port-string* is not specified, information for all ports will be displayed.

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Examples

This example shows how to display the EAPOL port control mode for Fast Ethernet front panel port 1:

```
Matrix>show dot1x auth-config authcontrolled-portcontrol fe.0.1
Port 1: Auth controlled port control:              Auto
```

This example shows how to display the 802.1X quiet period settings for Fast Ethernet front panel port 1:

```
Matrix>show dot1x auth-config quietperiod fe.0.1
 Port 1: Quiet period:          30
```

14.3.2.3 set dot1x

Use this command to enable or disable 802.1X authentication.

set dot1x {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables 802.1X.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable 802.1X:

```
Matrix>set dot1x enable
```


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14.3.2.4 set dot1x auth-config

Use this command to configure 802.1X authentication.

set dot1x auth-config {[**authcontrolled-portcontrol** {**auto** | **forced-auth** | **forced-unauth**}] [**keytxenabled** {**false** | **true**}] [**maxreq** *value*] [**quietperiod** *value*] [**reauthenabled** {**false** | **true**}] [**reauthperiod** *value*] [**servertimeout** *timeout*] [**supptimeout** *timeout*] [**txperiod** *value*]} *port-string*

Syntax Description

authcontrolled-portcontrol auto | **forced-auth** | **forced-unauth**	Specifies the EAPOL port control mode as: • **auto** - Auto authorization mode. This is the default mode and will forward frames according to the authentication state of the port. For details on this mode, refer to Table 14-2. • **forced-auth** - Forced authorized mode, which disables authentication on the port. • **forced-unauth** - Forced unauthorized mode, which filters and discards all frames received on the port.
keytxenabled false | **true**	Enables (**true**) or disables (**false**) 802.1X key transmission.
maxreq *value*	Specifies the maximum number of authentictation requests allowed. Valid values are **1** - **2147483647**.
quietperiod *value*	Specifies the time (in seconds) following a failed authentication before another attempt can be made. Valid values are **1** - **2147483647**.
reauthenabled false | **true**	Enables (**true**) or disables (**false**) reauthentication control.
reauthperiod *value*	Specifies the time lapse (in seconds) between attempts to reauthenticate a port. Valid values are **1** - **2147483647**.
servertimeout *timeout*	Specifies a timeout period (in seconds) for the authentication server. Valid values are **1** - **2147483647**.

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supptimeout *timeout*	Specifies a timeout period (in seconds) for the authentication supplicant. Valid values are **1** - **2147483647**.
txperiod *value*	Specifies the period (in seconds) allowed for the transmission of 802.1X keys. Valid values are **1** - **2147483647**.
port-string	Specifies the port(s) on which to configure authentication settings. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Alternative (v3.xx.xx and higher)

- **set eapol auth-mode** (Section 14.3.2.8)

Command Defaults

None.

Examples

This example shows how to set EAPOL port control to forced authorized mode on ports fe.0.1-5, which disables authentication on these ports:

```
Matrix>set dot1x auth-config authcontrolled-portcontrol forced-auth fe.0.1.5
```

This example shows how to enable reauthentication control on Fast Ethernet front panel ports 1-3:

```
Matrix>set dot1x auth-config reathenabled true fe.0.1-3
```

This example shows how to set the 802.1X quiet period to 120 seconds on Fast Ethernet front panel ports 1-3:

```
Matrix>set dot1x auth-config quietperiod 120 fe.0.1-3
```


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14.3.2.5 set dot1x port

Use this command to enable 802.1X reauthentication or initialization control on one or more ports.

set dot1x port *port-string* [**init** | **reauth**]

Syntax Description

port-string	Specifies the port(s) on which to enable reauthentication or reauthentication. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
init | **reauth**	(Optional) Enables initialization control or reauthentication.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, both initialization control and reauthentication on specified ports.

Example

This example shows how to enable reauthentication control on ports fe.0.1-5,:

```
Matrix>set dot1x port fe.0.1-5 reauth
```


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14.3.2.6 clear dot1x auth-config

Use this command to reset 802.1X authentication parameters to default values on one or more ports.

clear dot1x auth-config [**authcontrolled-portcontrol**] [**keytxenabled**] [**maxreq**] [**quietperiod**] [**reauthenabled**] [**reauthperiod**] [**servertimeout**] [**supptimeout**] [**txperiod**] [*port-string*]

Syntax Description

authcontrolled-portcontrol	(Optional) Resets the 802.1X port control mode to **auto**.
keytxenabled	(Optional) Resets the 802.1X key transmission state to disabled (**false**).
maxreq	(Optional) Resets the maximum requests value to **2**.
quietperiod	(Optional) Resets the quiet period value to **60** seconds.
reauthenabled	(Optional) Resets the reauthentication control state to disabled (**false**).
reauthperiod	(Optional) Resets the reauthentication period value to **60** seconds.
servertimeout	(Optional) Resets the server timeout value to **30** seconds.
supptimeout	(Optional) Resets the authentication supplicant timeout value to **30** seconds.
txperiod	(Optional) Resets the transmission period value to **30** seconds.
port-string	(Optional) Resets settings on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

- If no parameters are specified, all authentication parameters will be reset.
- If *port-string* is not specified, parameters will be set on all ports.

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Examples

This example shows how to reset the 802.1X port control mode to auto on all ports:

```
Matrix>clear dot1x auth-config authcontrolled-portcontrol
```

This example shows how to reset reauthentication control to disabled on Fast Ethernet front panel ports 1-3:

```
Matrix>clear dot1x auth-config reathenabled fe.0.1-3
```

This example shows how to reset the 802.1X quiet period to 60 seconds on Fast Ethernet front panel ports 1-3:

```
Matrix>clear dot1x auth-config quietperiod fe.0.1-3
```

14.3.2.7 show eapol

Use this command to display EAPOL settings for one or more ports.

show eapol [*port-string*]

Syntax Description

port-string	(Optional) Displays EAPOL status for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Only.

Command Alternatives (v3.xx.xx and higher)

- **show dot1x** (Section 14.3.2.1)
- **show dot1x auth-config authcontrolled-portcontrol** (Section 14.3.2.4)

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Command Defaults

If *port-string* is not specified, EAPOL settings for all ports will be displayed.

Example

This example shows how to display EAPOL status for Fast Ethernet front panel ports 1-3:

```
Matrix>show eapol fe.0.1-3
EAPOL is disabled.

Port      Authentication State    Authentication Mode
--------   --------------------   --------------------
fe.0.1     Initialized            Auto
fe.0.2     Initialized            Auto
fe.0.3     Initialized            Auto
```

Table 14-2 provides an explanation of the command output. For details on using the **set eapol** command to enable the protocol and assign an authentication mode, refer to Section 14.3.2.8.

Table 14-2 show eapol Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

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Table 14-2 show eapol Output Details (Continued)

Output	What It Displays...
Authentication State	Current EAPOL authentication state for each port. Possible internal states for the authenticator (switch) are: • **initialized**: A port is in the initialize state when: **a.** authentication is disabled, **b.** authentication is enabled and the port is not linked, or **c.** authentication is enabled and the port is linked. (In this case very little time is spent in this state, it immediately transitions to the connecting state, via disconnected. • **disconnected**: The port passes through this state on its way to connected whenever the port is reinitialized, via link state change, reauthentication failure, or management intervention. • **connecting**: While in this state, the authenticator sends request/ID messages to the end user. • **authenticating**: The port enters this state from connecting after receiving a response/ID from the end user. It remains in this state until the entire authentication exchange between the end user and the authentication server completes. • **authenticated**: The port enters this state from authenticating state after the exchange completes with a favorable result. It remains in this state until linkdown, logoff, or until a reauthentication begins. • **aborting**: The port enters this state from authenticating when any event occurs that interrupts the login exchange. • **held**: After any login failure the port remains in this state for the number of seconds equal to quietPeriod (can be set using MIB).

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Table 14-2 show eapol Output Details (Continued)

Output	What It Displays...
Authentication State (Cont'd)	• **forceAuth**: Management is allowing normal, unsecured switching on this port. • **forceUnauth**: Management is preventing any frames from being forwarded to or from this port.
Authentication Mode	Mode enabling network access for each port. Modes include: • **Auto**: Frames are forwarded according to the authentication state of each port. • **Forced Authorized Mode**: Meant to disable authentication on a port. It is intended for ports that support ISLs and devices that cannot authenticate, such as printers and file servers. If a default policy is applied to the port via the policy profile MIB, then frames are forwarded according to the configuration set by that policy, otherwise frames are forwarded according to the current configuration for that port. Authentication using 802.1X is not possible on a port in this mode. • **Forced Unauthorized Mode**: All frames received on the port are discarded by a filter. Authentication using 802.1X is not possible on a port in this mode.

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14.3.2.8 set eapol

Use this command to enable or disable EAPOL port-based user authentication with the RADIUS server and to set the authentication mode for one or more ports.

set eapol [**enable** | **disable** | **auth-mode** {**auto** | **forced-authorized** | **forced-unauthorized**} *port-string*

Syntax Description

enable | **disable**	Enables or disables EAPOL.
auth-mode auto | **forced-authorized** | **forced-unauthorized**	Specifies the authorization mode as: • **auto** - Auto authorization mode. This is the default mode and will forward frames according to the authentication state of the port. For details on this mode, refer to Table 14-2. • **forced-authorized** - Forced authorized mode, which disables authentication on the port. • **forced-unauthorized** - Forced unauthorized mode, which filters and discards all frames received on the port.
port-string	Specifies the port(s) on which to set EAPOL parameters. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

When enabled, **auth-mode** defaults to **auto**.

Command Alternatives (v3.xx.xx and higher)

- **set dot1x** (Section 14.3.2.3)
- **set dot1x auth-config authcontrolled-portcontrol** (Section 14.3.2.4)

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Examples

This example shows how to enable EAPOL:

```
Matrix>set eapol enable
```

This example shows how to enable EAPOL with forced unauthorized mode on Fast Ethernet front panel port 1:

```
Matrix>set eapol auth-mode forced-unauthorized fe.0.1
```

14.3.3 Configuring MAC Authentication

Purpose

To review, disable, enable and configure MAC authentication. This allows the device to authenticate source MAC addresses in an exchange with an authentication server. The authenticator (switch) selects a source MAC seen on a MAC-authentication enabled port and submits it to a backend client for authentication. The backend client uses the MAC address stored password, if required, as credentials for an authentication attempt. If accepted, a string representing an access policy may be returned. If present, the switch applies the associated policy rules. For an overview on working with MAC authentication, refer to Section 14.4.2.

NOTES: When both 802.1X (EAPOL) and MAC authentication are enabled on the same Matrix E1 device, the switch enforces a precedence relationship between MAC authentication and 802.1X methods. For more information on these precedence rules, refer to Section 14.4.3.2.

The Matrix E1 MAC authentication commands have no direct interdependencies with the MAC locking commands described in Section 14.3.4. When a frame arrives at a port, the Matrix E1 device runs the MAC locking algorithm first. If the frame passes the MAC lock (i.e., it is not in violation), then the frame is eligible for authentication.

Commands

The commands needed to review, enable, disable, and configure MAC authentication are listed below and described in the associated section as shown:

- show macauthentication (Section 14.3.3.1)
- show macauthentication session (Section 14.3.3.2)
- set macauthentication (Section 14.3.3.3)

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- set macauthentication password (Section 14.3.3.4)
- set macauthentication port (Section 14.3.3.5)
- set macauthentication portinitialize (Section 14.3.3.6)
- set macauthentication macinitialize (Section 14.3.3.7)
- set macauthentication reauthentication (Section 14.3.3.8)
- set macauthentication portreauthenticate (Section 14.3.3.9)
- set macauthentication macreauthenticate (Section 14.3.3.10)
- set macauthentication reauthperiod (Section 14.3.3.11)
- set macauthentication quietperiod (Section 14.3.3.12)

14.3.3.1 show macauthentication

Use this command to display MAC authentication information for one or more ports.

show macauthentication [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC authentication information for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If *port-string* is not specified, MAC authentication information will be displayed for all ports.

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Example

This example shows how to display MAC authentication information for Fast Ethernet front panel ports 1 through 15:

```
Matrix>show macauthentication fe.0.1-15
 MAC authentication             - disabled
 MAC user password              - NOPASSWORD
 Port username significant bits  - 48

 Port     Port     Quiet      Reauth     Auth     Auth      Reauthentications
          State    Period     Period     Allowed  Allocated
 -------  -------- ---------- ---------- -------- --------- -----------------
 fe.0.1   disabled 30         3600       1        1         disabled
 fe.0.2   disabled 30         3600       1        1         disabled
 fe.0.3   disabled 30         3600       1        1         disabled
 fe.0.4   disabled 30         3600       1        1         disabled
 fe.0.5   disabled 30         3600       1        1         disabled
 fe.0.6   disabled 30         3600       1        1         disabled
 fe.0.7   disabled 30         3600       1        1         disabled
 fe.0.8   disabled 30         3600       1        1         disabled
 fe.0.9   disabled 30         3600       1        1         disabled
 fe.0.10  disabled 30         3600       1        1         disabled
 fe.0.11  disabled 30         3600       1        1         disabled
 fe.0.12  disabled 30         3600       1        1         disabled
 fe.0.13  disabled 30         3600       1        1         disabled
 fe.0.14  disabled 30         3600       1        1         disabled
 fe.0.15  disabled 30         3600       1        1         disabled
```

Table 14-3 provides an explanation of the command output.

Table 14-3 show macauthentication Output Details

Output	What It Displays...
MAC authentication	Whether MAC authentication is globally enabled or disabled. Set using the **set macauthentication** command as described in Section 14.3.3.3.
MAC user password	User password associated with MAC authentication on the device. Set using the **set macauthentication password** command as described in Section 14.3.3.4.

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Table 14-3 show macauthentication Output Details (Continued)

Output	What It Displays...
Port username significant bits	Number of significant bits in the MAC addresses to be used starting with the left-most bit of the vendor portion of the MAC address. The significant portion of the MAC address is sent as a user-name credential when the primary attempt to authenticate the full MAC address fails. Any other failure to authenticate the full address, (i.e., authentication server timeout) causes the next attempt to start once again with a full MAC authentication. Default is 48 and cannot be reset.
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
Port State	Whether or not MAC authentication is enabled or disabled on this port.
Quiet Period	Quiet period for this port. Default value of **30** can be changed using the **set macauthentication quietperiod** command described in Section 14.3.3.12.
Reauth Period	Reauthentication period for this port. Default value of **30** can be changed using the **set macauthentication reauthperiod** command described in Section 14.3.3.11.
Auth Allowed	Number of concurrent authentications supported on this port. Default is 1 and cannot be reset.
Auth Allocated	Maximum number of MAC authentications permitted on this port. Default is 1 and cannot be reset
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command described in Section 14.3.3.8.

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14.3.3.2 show macauthentication session

Use this command to display the active MAC authenticated sessions on one or more ports.

show macauthentication session [*port-string*]

Syntax Description

port-string	(Optional) Displays active MAC authenticated sessions for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If *port-string* is not specified, MAC session information will be displayed for all MAC authentication ports.

Example

This example shows how to display MAC session information for Fast Ethernet front panel port 2:

```
Matrix>show macauthentication session fe.0.2
Port       MAC Address      Duration   Reauth Period   Reauthentications
-----    -----------------  ---------- -------------   -----------------
fe.0.2   00-60-97-b5-4c-07  525         3600           disabled
```

Table 14-4 provides an explanation of the command output.

Table 14-4 show macauthentication session Output Details

Output	What It Displays...
Port	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
MAC Address	MAC address associated with the session.
Duration	Time, in seconds, this session has been active.

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Table 14-4 show macauthentication session Output Details (Continued)

Output	What It Displays...
Reauth Period	Reauthentication period for this port, set using the **set macauthentication reauthperiod** command described in Section 14.3.3.11.
Reauthentications	Whether or not reauthentication is enabled or disabled on this port. Set using the **set macauthentication reauthentication** command described in Section 14.3.3.8.

14.3.3.3 set macauthentication

Use this command to globally enable or disable MAC authentication.

set macauthentication {**enable** | **disable**}

Syntax Description

enable | **disable**	Globally enables or disables MAC authentication.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to globally enable MAC authentication:

```
Matrix>set macauthentication enable
```


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14.3.3.4 set macauthentication password

Use this command to set a MAC authentication password.

set macauthentication password *password*

Syntax Description

password	Specifies a text string MAC authentication password.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the MAC authentication password to “macauth”:

```
Matrix>set macauthentication password macauth
```


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14.3.3.5 set macauthentication port

Use this command to enable or disable one or more ports for MAC authentication.

set macauthentication port {**enable** | **disable**}[*port-string*]

NOTE: Enabling port(s) for MAC authentication requires globally enabling MAC authentication on the device as described in Section 14.3.3.3, and then enabling it on a port-by-port basis. By default, MAC authentication is globally disabled and disabled on all ports.

Syntax Description

enable | **disable**	Enables or disables MAC authentication.
port-string	(Optional) Enables or disables MAC authentication on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, MAC authentication will be enabled or disabled on all ports.

Example

This example shows how to enable MAC authentication on Fast Ethernet front panel ports 1 through 5:

```
Matrix>set macauthentication port enable fe.0.1-5
```


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14.3.3.6 set macauthentication portinitialize

Use this command to force one or more MAC authentication ports to re-initialize and remove any currently active sessions on those ports.

set macauthentication portinitialize [*port-string*]

Syntax Description

port-string	(Optional) Re-initializes specific MAC authentication port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, all MAC authentication ports will be initialized.

Example

This example shows how to force Fast Ethernet front panel ports 1 through 5 to initialize:

```
Matrix>set macauthentication portinitialize fe.0.1-5
```

14.3.3.7 set macauthentication macinitialize

Use this command to force a current MAC authentication session to re-initialize and remove the session.

set macauthentication macinitialize *mac_addr*

Syntax Description

mac_addr	Specifies the MAC address of the session to re-initialize.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to re-initialize:

```
Matrix>set macauthentication macinitialize 00-60-97-b5-4c-07
```

14.3.3.8 set macauthentication reauthentication

Use this command to enable or disable reauthentication of all currently authenticated MAC addresses on one or more ports.

set macauthentication reauthentication {**enable** | **disable**} [*port-string*]

Syntax Description

enable | **disable**	Enables or disables MAC reauthentication.
port-string	(Optional) Enables or disables MAC reauthentication on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, reauthentication will be enabled or disabled on all MAC authentication ports.

Example

This example shows how to enable MAC reauthentication on Fast Ethernet front panel ports 1 through 5:

```
Matrix>set macauthentication reauthentication enable fe.0.1-5
```


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14.3.3.9 set macauthentication portreauthenticate

Use this command to force an immediate reauthentication of the currently active sessions on one or more MAC authentication ports.

set macauthentication portreauthenticate [*port-string*]

Syntax Description

port-string	(Optional) Forces reauthentication of specific MAC authentication port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, all MAC authentication ports will be forced to reauthenticate.

Example

This example shows how to force Fast Ethernet front panel ports 1 through 5 to reauthenticate:

```
Matrix>set macauthentication portreauthentication fe.0.1-5
```

14.3.3.10set macauthentication macreauthenticate

Use this command to force an immediate reauthentication of a MAC address.

set macauthentication macreauthenticate *mac_addr*

Syntax Description

mac_addr	Specifies the MAC address of the session to reauthenticate.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Example

This example shows how to force the MAC authentication session for address 00-60-97-b5-4c-07 to reauthenticate:

```
Matrix>set macauthentication macreauthenticate 00-60-97-b5-4c-07
```

14.3.3.11 set macauthentication reauthperiod

Use this command to set the MAC reauthentication period (in seconds). This is the time lapse between attempts to reauthenticate any current MAC address authenticated to a port.

set macauthentication reauthperiod *time* [*port-string*]

Syntax Description

time	Specifies the number of seconds between reauthentication attempts. Valid values are **1** - **4294967295**.
port-string	(Optional) Sets the MAC reauthentication period on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, the reauthentication period will be set on all MAC authentication ports.

Example

This example shows how to globally set the MAC reauthentication period to 7200 seconds (2 hours):

```
Matrix>set macauthentication reauthperiod 7200
```


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14.3.3.12set macauthentication quietperiod

Use this command to set the time (in seconds) following a failed MAC authentication before another attempt can be made through a port.

set macauthentication quietperiod *time* [*port-string*]

Syntax Description

time	Specifies the number of seconds between reauthentication attempts. Valid values are **1** - **4294967295**. Default is **30**.
port-string	(Optional) Sets the MAC authentication quiet period on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If *port-string* is not specified, the authentication quiet period will be set on all MAC authentication ports.

Example

This example shows how to globally set the MAC quiet period to 3600 seconds (1 hour):

```
Matrix>set macauthentication quietperiod 3600
```


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14.3.4 Configuring MAC Locking

Purpose

To review, disable, enable and configure MAC locking. This locks a port to one or more MAC addresses, preventing connection of unauthorized devices via the port(s). When source MAC addresses are received on specified ports, the switch discards all subsequent frames not containing the configured source addresses. The only frames forwarded on a “locked” port are those with the “locked” MAC address(es) for that port.

NOTE: The Matrix E1 MAC locking commands have no direct interdependencies with the MAC authentication commands described in Section 14.3.3. When a frame arrives at a port, the Matrix E1 device runs the MAC locking algorithm first. If the frame passes the MAC lock (i.e., it is not in violation), then the frame is eligible for authentication.

Commands

The commands needed to configure MAC locking are listed below and described in the associated section as shown:

- show maclock (Section 14.3.4.1)
- show maclock stations (Section 14.3.4.2)
- set maclock enable (Section 14.3.4.3)
- set maclock disable (Section 14.3.4.4)
- set maclock (Section 14.3.4.5)
- set maclock firstarrival (Section 14.3.4.6)
- set maclock static (Section 14.3.4.7)
- set maclock move (Section 14.3.4.8)
- clear maclock static (Section 14.3.4.9)
- show maclock autostatic (Section 14.3.4.10)
- set maclock autostatic (Section 14.3.4.11)
- set maclock autostatic isl (Section 14.3.4.12)
- set maclock autostatic publicvlan (Section 14.3.4.13)
- set maclock autostatic publicmac (Section 14.3.4.14)
- set maclock autostatic passthroughmac (Section 14.3.4.15)

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- clear maclock autostatic (Section 14.3.4.16)
- set maclock trap (Section 14.3.4.17)
- clear maclock (Section 14.3.4.18)

14.3.4.1 show maclock

Use this command to display the status of MAC locking on one or more ports.

show maclock [*port-string*]

Syntax Description

port-string	(Optional) Displays MAC locking status for specified port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, MAC locking status will be displayed for all ports.

Command Type

Switch command.

Command Mode

Read-Only.

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Examples

This example shows how to display global MAC locking information:

```
Matrix>show maclock

 MAC Locking is globally enabled.

   Port      Port      Trap    Max Static Max FirstArrival       Violating
  Number    Status    Status   Allocated    Allocated           MAC Address
 --------  --------  --------  ---------  ------------      ------------------
 fe.0.1    disabled  disabled      15         600
 fe.0.2    enabled   enabled       0          5
 fe.0.3    disabled  disabled      15         200
 fe.0.4    disabled  disabled      0          0
 fe.0.5    disabled  disabled      3          600
 fe.0.6    disabled  disabled      15         600
 fe.0.7    disabled  disabled      15         600
 fe.0.8    enabled   disabled      15         600
 fe.0.9    disabled  disabled      15         600
 fe.0.10   disabled  disabled      15         600
 fe.0.11   disabled  disabled      15         600
 fe.0.12   disabled  disabled      15         600
 fe.0.13   disabled  disabled      15         600
 fe.0.14   disabled  disabled      15         600
 fe.0.15   disabled  disabled      15         600
 fe.0.16   disabled  disabled      15         600
--More--
```

This example shows how to display MAC locking information for Fast Ethernet front panel port 8:

```
Matrix>show maclock fe.0.8

 MAC Locking is globally enabled.

   Port      Port      Trap    Max Static Max FirstArrival       Violating
  Number    Status    Status   Allocated    Allocated           MAC Address
 --------  --------  --------  ---------  ------------      ------------------
 fe.0.8    enabled   disabled      15         600
```

Table 14-5 provides an explanation of the command output.

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Table 14-5 show maclock Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
Port Status	Whether MAC locking is **enabled** or **disabled** on the port. MAC locking is globally disabled by default. For details on using **set maclock** commands to enable it on the device and on one or more ports, refer to Section 14.3.4.3 and Section 14.3.4.5.
Trap Status	Whether MAC lock trap messaging is **enabled** or **disabled** on the port. For details on setting this status using the **set maclock trap** command, refer to Section 14.3.4.17.
Max Static Allocated	The maximum static MAC addresses allowed locked to the port. For details on setting this value using the **set maclock static** command, refer to Section 14.3.4.7.
Max FirstArrival Allocated	The maximum end station MAC addresses allowed locked to the port. For details on setting this value using the **set maclock firstarrival** command, refer to Section 14.3.4.6.
Violating MAC Address	Any MAC address(es) violating the maximum static and first arrival value(s) set for the port.

14.3.4.2 show maclock stations

Use this command to display MAC locking information about end stations connected to the device.

show maclock stations [*port-string*] [**firstarrival** | **firstarrival** *port-string*] [**static** | **static** *port-string*]

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Syntax Description

port-string	(Optional) Displays end station information for specified port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.
firstarrival | **firstarrival** *port-string*	(Optional) Displays MAC locking information about end stations first connected to all MAC locked ports, or about those first connected to specific port(s).
static | **static** *port-string*	(Optional) Displays MAC locking information about static (management defined) end stations connected to all MAC locked ports, or about those connected to specific port(s).

Command Defaults

If no parameters are specified, MAC locking information will be displayed for all end stations.

Command Type

Switch command.

Command Mode

Read-Only.

Examples

This example shows how to display MAC locking information for all end stations known to the device:

```
Matrix>show maclock stations

 Number of stations found: 5

 Port Number     MAC address          Status               State
 ------------    -----------------   ---------------      --------------
 fe.0.5          00-00-00-11-22-33    active               static
 fe.0.8          00-20-78-06-0e-a0    active               first learned
 fe.0.8          00-44-55-44-55-21    active               static
 fe.0.8          00-a0-39-00-0c-7b    active               first learned
 fe.0.22         11-22-33-44-55-66    active               static
```


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This example shows how to display MAC locking information for the end stations connected to Fast Ethernet front panel port 8:

```
Matrix>show maclock stations fe.0.8

 Number of stations found: 3

 Port Number     MAC address         Status              State
 ------------    -----------------   ---------------     -------------
 fe.0.8          00-20-78-06-0e-a0   active              first learned
 fe.0.8          00-44-55-44-55-21   active              static
 fe.0.8          00-a0-39-00-0c-7b   active              first learned
```

Table 14-6 provides an explanation of the command output.

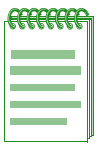
Table 14-6 show maclock stations Output Details

Output	What It Displays...
Port Number	Port designation. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
MAC address	MAC address of the end station(s) locked to the port.
Status	Whether the end stations are **active** or **inactive**.
State	Whether the end station locked to the port is a **first learned, first arrival** or **static** connection.

14.3.4.3 set maclock enable

Use this command to enable MAC locking on one or more ports. When enabled and configured for a specific MAC address and port string, this locks a port so that only one end station address is allowed to participate in frame relay.

set maclock enable [*port-string*]



NOTE: MAC locking is disabled by default at device startup. Configuring one or more ports for MAC locking requires globally enabling it on the device and then enabling it on the desired ports as described in Section 14.3.4.5.

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Syntax Description

port-string	(Optional) Enables MAC locking on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, MAC locking will be enabled on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable MAC locking on Fast Ethernet front panel port 3:

```
Matrix>set maclock enable fe.0.3
```

14.3.4.4 set maclock disable

Use this command to disable MAC locking on one or more ports.

set maclock disable [*port-string*]

Syntax Description

port-string	(Optional) Disables MAC locking on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, MAC locking will be disabled on all ports.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to disable MAC locking on Fast Ethernet front panel port 3:

```
Matrix>set maclock disable fe.0.3
```

14.3.4.5 set maclock

Use this command to create a static MAC address and enable or disable MAC locking for the specific MAC address and port. When created and enabled, this allows only the end station designated by the MAC address to participate in frame relay.

set maclock *mac_address port-string* {**create** | **enable** | **disable**}

NOTE: Configuring one or more ports for MAC locking requires globally enabling it on the device first using the **set maclock enable** command as described in Section 14.3.4.3.

Syntax Description

mac_address	Specifies the MAC address for which MAC locking will be created, enabled or disabled.
port-string	Specifies the port on which to create, enable or disable MAC locking. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
create	Establishes a MAC locking association between the specified MAC address and port. Create automatically enables MAC locking between the specified MAC address and port.
enable | **disable**	Enables or disables MAC locking between the specified MAC address and port.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to create a MAC locking association between MAC address 00-a0-c9-0d-32-11 and Fast Ethernet front panel port 3:

```
Matrix>set maclock 00-a0-c9-0d-32-11 fe.0.3 create
```

14.3.4.6 set maclock firstarrival

Use this command to restrict MAC locking on a port to a maximum number of end station addresses first connected to that port.

set maclock firstarrival *port-string value*

Syntax Description

port-string	Specifies the port on which to limit MAC locking. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
value	Specifies the number of first arrival end station MAC addresses to be allowed connections to the port. Valid values are **0** to **600**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to restrict MAC locking to 6 MAC addresses on Fast Ethernet front panel port 3:

```
Matrix>set maclock firstarrival fe.0.3 6
```


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14.3.4.7 set maclock static

Use this command to restrict MAC locking on a port to a maximum number of static (management defined) MAC addresses for end stations connected to that port.

set maclock static *port-string value*

Syntax Description

port-string	Specifies the port on which to limit MAC locking. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
value	Specifies the number of static MAC addresses to be allowed connections to the port. Valid values are **0** to **20**. The default value is 20.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to use restrict MAC locking to 4 static addresses on Fast Ethernet front panel port 3:

```
Matrix>set maclock static fe.0.3 4
```


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14.3.4.8 set maclock move

Use this command to move all current first arrival MACs to static entries.

set maclock move *port-string*

Syntax Description

port-string	Specifies the port where all current first arrival MACs will be moved to static entries. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to move all current first arrival MACs to static entries on Fast Ethernet front panel port 3:

```
Matrix>set maclock move fe.0.3
```

14.3.4.9 clear maclock static

Use this command to remove statically locked MACs from a port.

clear maclock static *port-string*

Syntax Description

port-string	Specifies the port from which statically locked MACs will be removed. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

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Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to remove statically locked MACs from Fast Ethernet front panel port 3:

```
Matrix>clear maclock static fe.0.3
```

14.3.4.10show maclock autostatic

Use this command to display the status of the MAC locking autostatic function on one or more ports.

show maclock autostatic [**port** *port-string*]

Syntax Description

port *port-string*	(Optional) Displays the status of the MAC locking autostatic function on specified port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, the status of the MAC locking autostatic function will be displayed for all ports, as well as the public ingress and egress VLANs and public MAC address configured for the autostatic function.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display the status of the MAC locking autostatic function. In this case, public ingress and egress VLANs, and the public MAC address has not been set, and the autostatic and public VLAN autolearn functions are in their default state of disabled:

```
Matrix>show maclock autostatic

The public ingress vlan is : 0
The public egress vlan is : 0
The autostatic public MAC Address is 00:00:00:00:00:00
The autostatic pass through MAC Address is 01:00:5e:00:00:05

Port AutoStatic ISL AutoLearn
-------------------------------------
fe.0.1 disabled disabled
fe.0.2 disabled disabled
fe.0.3 disabled disabled
fe.0.4 disabled disabled
--More--
```

14.3.4.11set maclock autostatic

Use this command to enable or disable the MAC locking autostatic function, which allows addresses learned through dynamic MAC locking to automatically be configured as static addresses. The static address count (as described in Section 14.3.4.7) will be used to determine when to lock the port. When the MAC locking autostatic function is enabled on a port, the address will not be allowed to move to another port. If the autostatic function is not enabled, static MAC locking can still be applied to multiple ports to “scope” valid ports for a particular MAC address. Once enabled the autostatic function is enabled, the dynamic address count will be disregarded unless it is zero. If it is zero, the port will be locked and no further address learning will be allowed.

set maclock autostatic *port-string* [**enable** | **disable**]

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Syntax Description

port-string	Specifies the port(s) on which to enable or disable the MAC locking autostatic function. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	(Optional) Enables or disables the MAC locking autostatic function.

Command Defaults

If **disable** is not specified, the MAC locking autostatic function will be enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the MAC locking autostatic function on Fast Ethernet front panel port 3:

```
Matrix>set maclock autostatic fe.0.3 enable
```

14.3.4.12set maclock autostatic isl

Use this command to enable or disable automatic learning of the MAC locking autostatic public VLAN. In rare cases, if the ingress VLAN of traffic to the switch is different from the egress VLAN(s) traffic use to leave the switch, the this command can be used with the **set maclock autostatic publicvlan** command (Section 14.3.4.13) and the **set maclock autostatic publicmac** command (Section 14.3.4.14) to automatically assign MAC-VID bindings to both the ingress and egress ports to improve switch performance.

NOTE: Enterasys Networks recommends that you contact Technical Support before attempting to use this feature.

set maclock autostatic isl *port-string* [**enable** | **disable**]

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Syntax Description

port-string	Specifies the port(s) on which to enable or disable the auto learning function. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	(Optional) Enables or disables the auto learning function.

Command Defaults

If **disable** is not specified, automatic learning will be enabled.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable the automatic learning of the MAC locking autostatic public VLAN on Fast Ethernet front panel port 3:

```
Matrix>set maclock autostatic isl fe.0.3 enable
```

14.3.4.13set maclock autostatic publicvlan

Use this command to set the public ingress or egress VLAN that can be used with autostatic MAC locking.

set maclock autostatic publicvlan *vlan-id* {**ingress** | **egress**}

Syntax Description

vlan-id	Specifies a VLAN ID.
ingress | **egress**	Specifies whether to use the VLAN as an ingress or egress VLAN.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to assign VLAN 3 as the public ingress VLAN for autostatic MAC locking:

```
Matrix>set maclock autostatic publicvlan 3 ingress
```

14.3.4.14set maclock autostatic publicmac

Use this command to set the public MAC address to which all ports communicate when MAC locking autostatic is enabled.

set maclock autostatic publicmac *mac-address*

Syntax Description

mac-address	Specifies a MAC address.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign MAC address 00-a0-c9-0d-32-11 as the public autostatic MAC locking address:

```
Matrix>set maclock autostatic publicmac 00-a0-c9-0d-32-11
```


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14.3.4.15set maclock autostatic passthroughmac

Use this command to enable a received multicast destination MAC address to be scoped to VLAN egress lists other than that of the VLAN of which it is a member.

set autostatic passthroughmac *mac-address*

NOTE: For this command to work properly, both the public ingress and egress VLANs must be configured for autostatic MAC locking and described in Section 14.3.4.13, and the pass through MAC address must be a multicast address. Improper use of this command may result in connectivity issues.

Syntax Description

mac-address	Specifies a MAC address.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to assign MAC address 01:00:5e:00:00:05 as the autostatic MAC pass through address:

```
Matrix>set maclock autostatic pssthrough mac 01:00:5e:00:00:05
```


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14.3.4.16clear maclock autostatic

Use this command to clear the MAC locking autostatic configuration(s) on one or more ports.

clear maclock autostatic [*port-string*] | [**isl** *port-string* | **publicmac** | **publicvlan** {**egress** | **ingress**} | **passthroughmac**]

Syntax Description

isl *port-string*	Resets autolearning of the autostatic public VLAN back to the default state of disabled for one or more ports.; ; or clears the public VLAN ID on specified ports.
publicmac	Clears the autostatic public MAC address.
publicvlan egress | **ingress**	Clears the autostatic public egress or ingress VLAN.
passthroughmac	Clears the MAC multicast pass through address.
port-string	(Optional when **isl** is not specified.) Clears/resets the MAC locking autostatic configuration on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If no arguments are specified, all autostatic configurations will be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to reset the MAC locking autostatic function on Fast Ethernet front panel port 3 back to the default state of disabled:

```
Matrix>clear maclock autostatic fe.0.3
```


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14.3.4.17set maclock trap

Use this command to enable or disable MAC lock trap messaging. When enabled, this authorizes the device to send an SNMP trap message if an end station is connected that exceeds the maximum values configured using the **set maclock firstarrival** and **set maclock static** commands. Violating MAC addresses are dropped from the device's routing table.

set maclock trap *port-string* {**enable** | **disable**}

Syntax Description

port-string	Specifies the port on which MAC lock trap messaging will be enabled or disabled. For a detailed description of possible *port-string* values, refer to Section 4.1.2.
enable | **disable**	Enables or disables MAC lock trap messaging.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable MAC lock trap messaging on Fast Ethernet front panel port 3:

```
Matrix>set maclock trap fe.0.3 enable
```


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14.3.4.18clear maclock

Use this command to clear MAC locking from one or more static MAC addresses.

clear maclock *mac_address port-string*

Syntax Description

mac_address	Specifies the MAC address for which the MAC locking will be cleared.
port-string	Specifies the port on which to clear MAC locking. For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to clear MAC locking between MAC address 00-a0-c9-0d-32-11 and Fast Ethernet front panel port 3:

```
Matrix>clear maclock 00-a0-c9-0d-32-11 fe.0.3
```


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14.3.5 Configuring Port Web Authentication (PWA)

About PWA

PWA provides a way of authenticating a user on a switch port before allowing the user general access to the network. PWA locks down a port a user is attached to until after the user successfully logs in via a web browser and Secure Harbour™ — Enterasys Networks' web-based security interface — to access the Matrix E1 device. The device will pass all login information from the end station to a RADIUS server for authentication before turning the port on.

PWA is an alternative to 802.1X and MAC authentication. It allows only the essential protocols and services required by the authentication process on the segment between the end-station and the switch port. All other traffic is discarded. When a user is in the unauthenticated state, any traffic generated by the end-station will not go beyond the switch port to which the user is connected.

To log on using PWA, the user makes a request via a web browser for the Secure Harbour web page. Depending upon the authenticated state of the port, a login page or a logout page will display. When a user submits a login page with a configured username and password, the switch then authenticates the user via a preconfigured RADIUS server. If the login is successful, then the port that the end-station is connected to will be turned on and full network access will be granted according to the user's port configuration on the switch.

Purpose

To review, enable, disable, and configure Port Web Authentication (PWA).

NOTE: Port Web Authentication cannot be enabled if either MAC authentication or EAPOL (802.1X) is enabled. For information on disabling 802.1X, refer to Section 14.3.2.8. For information on disabling MAC authentication, refer to Section 14.3.3.3.

Commands

The commands needed to review and configure PWA are listed below and described in the associated section as shown:

- show pwa (Section 14.3.5.1)
- set pwa (Section 14.3.5.2)
- set pwa hostname (Section 14.3.5.3)
- set pwa displaylogo (Section 14.3.5.4)
- set pwa refreshtime (Section 14.3.5.5)

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- set pwa nameservices (Section 14.3.5.6)
- set pwa ipaddress (Section 14.3.5.7)
- set pwa protocol (Section 14.3.5.8)
- set pwa enhancedmode (Section 14.3.5.9)
- set pwa guestname (Section 14.3.5.10)
- set pwa guestpassword (Section 14.3.5.11)
- set pwa gueststatus (Section 14.3.5.12)
- set pwa initialize (Section 14.3.5.13)
- set pwa quietperiod (Section 14.3.5.14)
- set pwa maxrequests (Section 14.3.5.15)
- set pwa portcontrol (Section 14.3.5.16)

14.3.5.1 show pwa

Use this command to display port web authentication information.

show pwa

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Only.

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Example

This example shows how to display PWA information:

```
Matrix>show pwa
   PWA Status                    - disabled
   PWA Hostname                  - secureharbour
   PWA IP Address                - 0.0.0.0
   PWA Name Services             - disabled
   PWA Protocol                  - PAP
   PWA Enhanced Mode             - disabled
   PWA Logo                      - displayed
   PWA Guest Name                - guest
   PWA Guest Password            -
   PWA Guest Network Status      - disabled
   PWA Refresh Time              - 30

   Port    Mode               Auth Status     QuietPeriod  MaxReq
   ------- -----------------  --------------  -----------  -------
   ge.0.1  forceAuthorized    authenticated   60           2
   ge.0.2  forceAuthorized    authenticated   60           2
   ge.0.3  forceAuthorized    authenticated   60           2
   ge.0.4  forceAuthorized    authenticated   60           2
   ge.0.5  forceAuthorized    authenticated   60           2
   ge.0.6  forceAuthorized    authenticated   60           2
```

Table 14-7 provides an explanation of the command output.

Table 14-7 show pwa Output Details

Output	What It Displays...
PWA Status	Whether or not port web authentication is enabled or disabled. Default state of disabled can be changed using the **set pwa** command as described in Section 14.3.5.2.
PWA Hostname	Host name (URL) for accessing the Secure Harbour login / logoff web page. Default of secureharbour can be changed using the **set pwa hostname** command as described in Section 14.3.5.3.
PWA IP Address	IP address of the end station from which PWA will prevent network access until the user is authenticated. Set using the **set pwa ipaddress** command as described in Section 14.3.5.7.

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Table 14-7 show pwa Output Details (Continued)

Output	What It Displays...
PWA Name Services	Status of DNS and WINS clients. Default state of disabled can be changed using the **set pwa nameservices** command as described in Section 14.3.5.6.
PWA Protocol	Whether PWA protocol is CHAP or PAP. Default setting of PAP can be changed using the set pwa protocol command as described in Section 14.3.5.8.
PWA Enhanced Mode	Whether PWA enhanced mode is enabled or disabled. Default state of disabled can be changed using the **set pwa enhancedmode** command as described in Section 14.3.5.9.
PWA Logo	Whether the PWA logo will be displayed or hidden at user login. Default state of enabled (displayed) can be changed using the **set pwa displaylogo** command as described in Section 14.3.5.4.
PWA Guest Name	Guest user name for PWA enhanced mode networking. Default value of “guest” can be changed using the **set pwa guestname** command as described in Section 14.3.5.10.
PWA Guest Password	Guest user’s password. Default value of an empty string can be changed using the **set pwa guestpassword** command as described in Section 14.3.5.11.
PWA Guest Network Status	Whether PWA guest user status is disabled or enabled with RADIUS or no authentication. Default state of disabled can be changed using the **set pwa gueststatus** command as described in Section 14.3.5.12.
PWA Refresh Time	Interval in seconds at which the PWA screen will refresh. Default setting of 30 can be changed using the **set pwa refreshtime** command as described in Section 14.3.5.5.
Port	PWA port designation.
Mode	PWA port control mode. Default setting of force authorized can be changed using the **set pwa portcontrol** command as described in Section 14.3.5.16.
Auth Status	Whether or not the port state is disconnected, authenticating authenticated, or held (authentication has failed).

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Table 14-7 show pwa Output Details (Continued)

Output	What It Displays...
Quiet Period	Amount of time a port will be in the held state after a user unsuccessfully attempts to log on to the network. Default value of 60 can be changed using the **set pwa quietperiod** command as described in Section 14.3.5.14.
MaxReq	Maximum number of log on attempts allowed before transitioning the port to a held state. Default value of 2 can be changed using the **set pwa maxrequests** command as described in Section 14.3.5.15.

14.3.5.2 set pwa

Use this command to enable or disable port web authentication.

set pwa {**enable** | **disable**}

NOTE: Port Web Authentication cannot be enabled if either MAC authentication or EAPOL (802.1X) is enabled. For information on disabling 802.1X, refer to Section 14.3.2.8. For information on disabling MAC authentication, refer to Section 14.3.3.3.

Syntax Description

enable | **disable**	Enables or disables port web authentication.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable port web authentication:

```
Matrix>set pwa enable
```


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14.3.5.3 set pwa hostname

Use this command to set a port web authentication host name. This is a URL for accessing the PWA login page.

set pwa hostname *name*

Syntax Description

name	Specifies a name for accessing the PWA login page.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA host name to pwahost:

```
Matrix>set pwa hostname pwahost
```

14.3.5.4 set pwa displaylogo

Use this command to set the display options for the Enterasys Networks logo on the PWA website.

set pwa displaylogo {**display** | **hide**}

Syntax Description

display | **hide**	Displays or hides the Enterasys Networks logo when the PWA website displays.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to hide the Enterasys Networks logo:

```
Matrix>set pwa displaylogo hide
```

14.3.5.5 set pwa refreshtime

Use this command to set the port web authentication screen refresh time.

set pwa refreshtime *time*

Syntax Description

time	Specifies the time interval in seconds at which the PWA screen will refresh. Valid values are **0 - 120**.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA screen refresh time to 60 seconds:

```
Matrix>set pwa refreshtime 60
```


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14.3.5.6 set pwa nameservices

Use this command to enable or disable Domain Name Service (DNS) and Windows Internet Naming Services (WINS) clients. When disabled, the device will not spoof DNS or WINS on an un-authenticated port.

set pwa nameservices {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables DNS and WINS.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PWA name services:

```
Matrix>set pwa nameservices enable
```

14.3.5.7 set pwa ipaddress

Use this command to set the PWA IP address. This is the IP address of the end station from which PWA will prevent network access until the user is authenticated. It is bound to the host name configured in Section 14.3.5.3.

set pwa ipaddress *ip-address*

Syntax Description

ip-address	Specifies a globally unique IP address. This same value must be configured into every authenticating switch in the domain.

Command Defaults

None.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set a PWA IP address for 1.2.3.4:

```
Matrix>set pwa ipaddress 1.2.3.4
```

14.3.5.8 set pwa protocol
Use this command to set the port web authentication protocol.

set pwa protocol {**chap** | **pap**}

Syntax Description

chap | **pap**	Sets the PWA protocol to: • CHAP (PPP Challenge Handshake Protocol) - encrypts the username and password between the end-station and the switch port. • PAP (Password Authentication Protocol- does not provide any encryption between the end-station the switch port.

Command Defaults
None.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set a the PWA protocol to CHAP:

```
Matrix>set pwa protocol chap
```


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14.3.5.9 set pwa enhancedmode

Use this command to enable or disable PWA enhanced mode. When enabled, users on unauthenticated PWA ports can type any URL into a browser and be presented the PWA login page on their initial web access. They will also be granted guest networking privileges.

NOTE: In order for PWA enhanced mode to operate, PWA port control mode must be set to auto as described in Section 14.3.5.16.

set pwa enhancedmode {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables PWA enhanced mode.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PWA enhanced mode:

```
Matrix>set pwa enhancedmode enable
```


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14.3.5.10set pwa guestname

Use this command to set a guest user name for PWA enhanced mode networking. When enhanced mode is enabled (as described in Section 14.3.5.9), PWA will use this name to grant network access to guests without established login names and passwords.

set pwa guestname *name*

Syntax Description

name	Specifies a guest user name.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to set the PWA guest user name to guestuser:

```
Matrix>set pwa guestname guestuser
```

14.3.5.11set pwa guestpassword

Use this command to set the guest user password for PWA networking. When enhanced mode is enabled, (as described in Section 14.3.5.9) PWA will use this password and the guest user name to grant network access to guests without established login names and passwords.

set pwa guestpassword

Syntax Description

None.

Command Defaults

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Example

This example shows how to set the PWA guest user password name:

```
Matrix>set pwa guestpassword
Guest Password: *********
Retype Guest Password: *********
```

14.3.5.12set pwa gueststatus

Use this command to enable or disable guest networking for port web authentication. When enhanced mode is enabled (as described in Section 14.3.5.9), PWA will use a guest password and guest user name to grant network access with default policy privileges to users without established login names and passwords.

set pwa gueststatus {**authnone** | **authradius** | **disable**}

Syntax Description

authnone	Enables guest networking with no authentication method.
authradius	Enables guest networking with RADIUS authentication. Upon successful authentication from RADIUS, PWA will apply the policy returned from RADIUS to the PWA port.
disable	Disables guest networking.

Command Defaults

None.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to enable PWA guest networking with RADIUS authentication:

```
Matrix>set pwa guestnetworking authradius
```


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14.3.5.13set pwa initialize

Use this command to initialize a PWA port to its default unauthenticated state.

set pwa initialize [*port-string*]

Syntax Description

port-string	(Optional) Initializes specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, all ports will be initialized.

Command Type

Switch command.

Command Mode

Read-Write.

Example

This example shows how to initialize Fast Ethernet front panel ports 5-7:

```
Matrix>set pwa initialize fe.0.5-7
```

14.3.5.14set pwa quietperiod

Use this command to set the amount of time a port will remain in the held state after a user unsuccessfully attempts to log on to the network.

set pwa quietperiod *time* [*port-string*]

Syntax Description

time	Specifies quiet time in seconds.
port-string	(Optional) Sets the quiet period for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, quiet period will be set for all ports.

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Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the PWA quiet period to 30 seconds for Fast Ethernet front panel ports 5-7:

```
Matrix>set pwa quietperiod 30 fe.0.5-7
```

14.3.5.15set pwa maxrequests
Use this command to set the maximum number of log on attempts allowed before transitioning the PWA port to a held state.

set pwa maxrequests *requests* [*port-string*]

Syntax Description

requests	Specifies the maximum number of log on attempts.
port-string	(Optional) Sets the maximum requests for specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults
If *port-string* is not specified, maximum requests will be set for all ports.

Command Type
Switch command.

Command Mode
Read-Write.

Example
This example shows how to set the PWA maximum requests to 3 for all ports:

```
Matrix>set pwa maxrequests 3
```


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14.3.5.16set pwa portcontrol

Use this command to set the PWA port control mode.

set pwa portcontrol {**auto** | **forceauthorized** | **forceunauthorized** | **promiscuousauto**} [*port-string*]

Syntax Description

auto	Sets the port to auto mode. In this mode, the port is filtering traffic. Login/Logout screens are available, as is the Secure Harbour IP. Spoofing (ARP, DNS, WINS and DHCP) will respond to requests. If a default policy exists on the port, it will be ignored in the unauthenticated state. **NOTE:** In order for PWA enhanced mode to operate, port control mode must be set to auto.
forceauthorized	Sets the port to force authorized mode. In this mode, the port is transmitting and receiving traffic. The Web server Login/Logout screens are inaccessible, as is the Secure Harbour IP. Spoofing (ARP, DNS, WINS or DHCP) will not respond in this mode.
forceunauthorized	Sets the port to force unauthorized mode. In this mode, the port is essentially disabled.
promiscuousauto	Sets the port to promiscuous auto mode. In this mode, no filtering is done unless a default policy applies to the port.
port-string	(Optional) Sets the control mode on specific port(s). For a detailed description of possible *port-string* values, refer to Section 4.1.2.

Command Defaults

If *port-string* is not specified, control mode will be set for all ports.

Command Type

Switch command.

Command Mode

Read-Write.

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Example

This example shows how to set the PWA control mode to auto for all ports:

```
Matrix>set pwa portcontrol auto
```

14.3.6 Configuring Secure Shell (SSH)

Purpose

To review, enable, disable, and configure the Secure Shell (SSH) protocol. SSH provides a secure, remote connection to the device by permitting or denying access based on IP address, ciphers and MAC algorithms.

Commands

The commands needed to review and configure SSH are listed below and described in the associated section as shown:

- show ssh (Section 14.3.6.1)
- ssh (server) (Section 14.3.6.2)
- set ssh (Section 14.3.6.3)
- set ssh ciphers (Section 14.3.6.4)
- clear ssh ciphers (Section 14.3.6.5)
- set ssh port (Section 14.3.6.6)
- set ssh mac (Section 14.3.6.7)
- clear ssh mac (Section 14.3.6.8)
- set ssh rekeyintervalseconds (Section 14.3.6.9)
- set ssh passwordguesses (Section 14.3.6.10)
- set ssh logingracetime (Section 14.3.6.11)
- clear ssh keys (Section 14.3.6.12)
- clear ssh config (Section 14.3.6.13)

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14.3.6.1 show ssh

Use this command to display the current status and configuration of SSH on the device.

show ssh [**ciphers**] [**config admin** | **oper**] [**mac**] [**sessions**]

Syntax Description

ciphers	(Optional) Displays server supported ciphers.
config admin | **oper**	(Optional) Displays SSH administration (**admin**) or operational (**oper**) configuration settings.
mac	(Optional) Displays all server supported MAC algorithms.
sessions	(Optional) Displays information related to SSH sessions.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no parameters are specified, SSH status (enabled or disabled) will be displayed.

Examples

This example shows how to display SSH status on the device:

```
Matrix>show ssh
 Ssh is currently enabled.
```

This example shows how to display SSH operational configuration settings. In this case, settings have not been changed from default values:

```
Matrix>show ssh config oper
Port 22
MACS anymac
Ciphers anycipher
RekeyIntervalSeconds 3600
LoginGraceTime 60
PasswordGuesses 3
```


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This example shows how to display SSH session information, including server and client version numbers, remote login name(s), supported MAC algorithms, authentication keys and encryption cipher:

```
Matrix>show ssh sessions
SSH Session:  1 inbound
    Server Version:  SSH-2.0-3.0.4 SSH Secure Shell
    Username:  rw
    Client Host:  10.0.0.2
    Client Version:  SSH-1.99-3.1.0 SSH Secure Shell for Windows
    Host Key Exchange Algorithm:  diffie-hellman-group1-sha1
    Public Key Algorithm:  ssh-rsa
    MAC Hash Algorithm:  hmac-md5
    Cipher:  aes128-cbc

SSH Session:  2 outbound
    Server Version:  SSH-2.0-VShell_2_1_4_154 VShell
    Username:  krose
    Server Host:  10.0.0.2
    Client Version:  SSH-1.99-3.0.4 SSH Secure Shell
    Host Key Exchange Algorithm:  diffie-hellman-group1-sha1
    Public Key Algorithm:  ssh-dss
    MAC Hash Algorithm:  hmac-sha1
    Cipher:  aes128-cbc
```

14.3.6.2 set ssh

Use this command to enable or disable the SSH protocol on the device.

set ssh {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables SSH.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

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Example

This example shows how to disable SSH:

```
Matrix>set ssh disable
```

14.3.6.3 ssh

Use this command to configure a connection to an SSH server.

ssh *ipaddr login* [*port*]

Syntax Description

ipaddr	Specifies the IP address of the remote SSH server.
login	Specifies a login name for the remote SSH server.
port	(Optional) Specifies the remote SSH server's TCP listening port. Valid values are **1 - 65535**. The default of 22 can also be changed using the **set ssh port** command as described in Section 14.3.6.6.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

If not specified, TCP port 22 will be used as the SSH listening port.

Example

This example shows how to configure a connection to an SSH server at IP address 10.0.0.12 with a login of "rw":

```
Matrix>ssh 10.0.0.12 rw
```


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14.3.6.4 set ssh ciphers

Use this command to set the cipher name(s) used for SSH encryption.

set ssh ciphers {**all** | **anycipher** | **anystdcipher** | *ciphername*}

Syntax Description

all	Specifies that all supported ciphers will be allowed.
anycipher	Specifies that all server-supported ciphers will be allowed.
anystdcipher	Specifies that the subset of server and IETF-supported ciphers will be allowed.
ciphername	Specifies a user-named cipher. Valid values are: • **aes128-cbc** • **3des-cbc** • **blowfish-cbc** • t**wofish128-cbc** • **cast128-cbc** • **arcfour**

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the cipher name used for SSH encryption to “blowfish-cbc”:

```
Matrix>set ssh cipher blowfish-cbc
```


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14.3.6.5 clear ssh ciphers

Use this command to clear one or more cipher names used for SSH encryption.

clear ssh ciphers {**all** | *ciphername*}

Syntax Description

all	Resets the cipher name to the default: **anycipher**
ciphername	Specifies a user-named cipher to clear.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to rest SSH cipher names:

```
Matrix>clear ssh cipher all
```

14.3.6.6 set ssh port

Use this command to set the SSH listening port.

set ssh port *port_num*

Syntax Description

port_num	Specifies a TCP port as the SSH listening port.

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Example

This example shows how to set TCP port 4 as the SSH listening port:

```
Matrix>set ssh port 4
```

14.3.6.7 set ssh mac

Use this command to set the MAC algorithms supported by SSH. These algorithms provide integrity checking.

set ssh mac {**all** | **anymac** | **anystdmac** | *mac_name*}

Syntax Description

all	Specifies all server-supported MAC algorithms.
anymac	Specifies any server-supported MAC algorithms.
anystdmac	Specifies that the subset of server and IETF-supported MAC algorithms.
mac_name	Specifies a user-supplied MAC algorithm name. Valid values are: • **hmac-sha1** • **hmac-sha1-96** • **hmac-md5** • **hmac-md5-96** • **hmac-ripemd160**

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

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Example

This example shows how to set the SSH MAC algorithm to “hmac md5”:

```
Matrix>set ssh mac hmac-md5
```

14.3.6.8 clear ssh mac

Use this command to clear one or more MAC algorithms supported by SSH.

clear ssh mac {**all** | *mac_name*}

Syntax Description

all	Specifies that all server-supported MAC algorithms will be cleared.
mac_name	Specifies a MAC algorithm name to be cleared.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to clear all SSH MAC algorithms:

```
Matrix>clear ssh mac all
```


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14.3.6.9 set ssh rekeyintervalseconds

Use this command to set the number of seconds between SSH key exchanges.

set ssh rekeyintervalseconds *value*

Syntax Description

value	Specifies the interval (in seconds) between SSH key exchanges. Valid values are from **0** (which disables re-keying) to **86400**. Default is **3600**.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set the SSH re-key interval to 7200 (2 hours):

```
Matrix>set ssh rekeyinterval 7200
```

14.3.6.10set ssh passwordguesses

Use this command to set the number of SSH authentication attempts allowed before access is denied.

set ssh passwordguesses *value*

Syntax Description

value	Specifies the number of authentication attempts allowed before remote access is denied. Valid values are from **1** to **10**. Default is **3**.

Command Type

Switch command.

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Command Mode
Read-Write.

Command Defaults
None.

Example
This example shows how to set the number of SSH authentication attempts allowed to 1:

```
Matrix>set ssh passwordguesses 1
```

14.3.6.11set ssh logingracetime
Use this command to set the time interval for an SSH client to authenticate.

set ssh logingracetime *value*

Syntax Description

value	Specifies the number of seconds the client will be allowed to authenticate. Valid values are from **15** to **600**. Default is **60**.

Command Type
Switch command.

Command Mode
Read-Write.

Command Defaults
None.

Example
This example shows how to set the SSH login grace time to 120 seconds (2 minutes):

```
Matrix>set ssh logingracetime 120
```

14.3.6.12clear ssh keys
Use this command to regenerate new SSH authentication keys.

clear ssh keys

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Syntax Description

None.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to regenerate SSH keys:

```
Matrix>clear ssh keys

Generating 1024-bit dsa key pair

Key generated.
1024-bit dsa
Private key saved to sshdrv:/.ssh2/dsa
Public key saved to sshdrv:/.ssh2/dsa.pub
Generating 1024-bit rsa key pair

Key generated.

1024-bit rsa
Private key saved to sshdrv:/hostkey
Public key saved to sshdrv:/hostkey.pub
```

14.3.6.13clear ssh config

Use this command to reset the SSH configuration to default settings.

clear ssh config

Syntax Description

None.

Command Type

Switch command.

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Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to clear the SSH configuration:

```
Matrix>clear ssh config
```

14.3.7 Configuring Access Lists

Purpose

To review and configure security access lists (ACLs), which permit or deny access to routing interfaces based on protocol and source IP address restrictions.

Commands

The commands needed to review and configure security access lists are listed below and described in the associated section as shown:

- show access-lists (Section 14.3.7.1)
- access-list (standard) (Section 14.3.7.2)
- access-list (extended) (Section 14.3.7.3)
- ip access-group (Section 14.3.7.4)

14.3.7.1 show access-lists

Use this command to display configured IP access lists when operating in router mode.

show access-lists [*access-list-number*]

ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

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Syntax Description

access-list-number	(Optional) Displays access list information for a specific access list number. Valid values are between **1** and **199**.

Command Type

Router command.

Command Mode

Privileged EXEC: **Matrix>Router#**

Command Defaults

If *number* is not specified, the entire table of access lists will be displayed.

Example

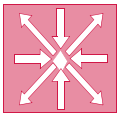
This example shows how to display IP access list number 101. This is an extended access list, which permits or denies ICMP, UDP and IP packets based on restrictions configured with the one of the **access-list** commands. For details on configuring standard access lists, refer to Section 14.3.7.2. For details on configuring extended access lists, refer to Section 14.3.7.3.

```
Matrix>Router#show access-lists 101
Extended IP access list 101
    permit icmp host 18.2.32.130 any
    permit udp host 198.92.32.130 host 171.68.225.126 eq
    deny ip 150.136.0.0 0.0.255.255 224.0.0.0 15.255.255.255
    deny ip 11.6.0.0 0.1.255.255 224.0.0.0 15.255.255.255 2)
    deny ip 172.24.24.0 0.0.1.255 224.0.0.0 15.255.255.255
```

14.3.7.2 access-list (standard)

Use this command to define a standard IP access list by number when operating in router mode. Restrictions defined by an access list are applied by using the **ip access-group** command (Section 14.3.7.4).

access-list *access-list-number* [**insert** | **replace** *entry*] | [**move** *destination source1* [*source2*]] {**deny** | **permit**} *source* [*source-wildcard*]



ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

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To insert or replace an ACL entry:

access-list *access-list-number* **insert** | **replace** *entry*

To move entries within an ACL:

access-list *access-list-number* **move** *destination source1* [*source2*]

NOTE: Valid *access-list-numbers* for standard ACLs are **1** to **99**. For extended ACLs, valid values are **100** to **199**.

Syntax Description

access-list-number	Specifies a standard access list number. Valid values are from **1** to **99.**
insert | **replace** *entry*	(Optional) Inserts this new entry before a specified entry in an existing ACL, or replaces a specified entry with this new entry.
move *destination source1 source2*	(Optional) Moves a sequence of access list entries before another entry. *Destination* is the number of the existing entry before which this new entry will be moved. *Source1* is a single entry number or the first entry number in the range to be moved. *Source2* (optional) is the last entry number in the range to be moved. If not specified, only the *source1* entry will be moved.
deny | **permit**	Denies or permits access if specified conditions are met.
protocol	Specifies an IP protocol for which to deny or permit access. Valid values and their corresponding protocols are: • **ip** - Any Internet protocol • **icmp** - Internet Control Message Protocol • **udp** - User Datagram Protocol • **tcp** - Transmission Protocol
source	Specifies the network or host from which the packet will be sent. Valid options for expressing source are: • IP address or range of addresses (A.B.C.D) • **any** - Any source host • **host** *source* - IP address of a single source host
source-wildcard	(Optional) Specifies the bits to ignore in the *source* address.

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Command Syntax of the "no" Form

The "no" form of this command removes the defined access list or entry:

no access-list *access-list-number* [*entry*]

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

- If **insert, replace** or **move** are not specified, the new entry will be appended to the access list.
- If *source2* is not specified with **move**, only one entry will be moved.

Examples

This example shows how to allow access to only those hosts on the three specified networks. The wildcard bits apply to the host portions of the network addresses. Any host with a source address that does not match the access list statements will be rejected:

```
Matrix>Router(config)#access-list 1 permit 192.5.34.0 0.0.0.255
Matrix>Router(config)#access-list 1 permit 128.88.0.0 0.0.255.255
Matrix>Router(config)#access-list 1 permit 36.0.0.0 0.255.255.255
```

This example moves entry 16 to the beginning of ACL 144:

```
Matrix>Router(config)#access-list 144 move 1 16
```

14.3.7.3 access-list (extended)

Use this command to define an extended IP access list by number when operating in router mode. Restrictions defined by an access list are applied by using the **ip access-group** command as described in Section 14.3.7.4.

access-list *access-list-number* [**insert** | **replace** *entry*] | [**move** *destination source1* [*source2*]] {**deny** | **permit**} *protocol source* [*source-wildcard*] [*operator* [*port*]] *destination* [*destination-wildcard*] [*operator* [*port*]] [*icmp-type* [*icmp-code*] [**established**]

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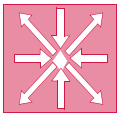


ROUTER: These commands can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

To insert or replace an ACL entry:

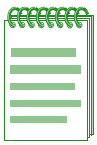
access-list *access-list-number* **insert** | **replace** *entry*

To move entries within an ACL:

access-list *access-list-number* **move** *destination source1* [*source2*]

To apply ACL restrictions to IP, UDP, TCP or ICMP packets:

access-list *access-list-number* {**deny** | **permit**} *protocol source* [*source-wildcard*] [*operator* [*port*]] *destination* [*destination-wildcard*] [*operator* [*port*]] [*icmp-type* [*icmp-code*] [**established**]



NOTE: Valid *access-list-numbers* for extended ACLs are **100** to 1**99**. For standard ACLs, valid values are **1** to **99**.

Syntax Description

access-list-number	Specifies an extended access list number. Valid values are from **100** to **199**.
insert | **replace** *entry*	(Optional) Inserts this new entry before a specified entry in an existing ACL, or replaces a specified entry with this new entry.
move *destination source1 source2*	(Optional) Moves a sequence of access list entries before another entry. *Destination* is the number of the existing entry before which this new entry will be moved. *Source1* is a single entry number or the first entry number in the range to be moved. *Source2* (optional) is the last entry number in the range to be moved. If not specified, only the *source1* entry will be moved.
deny | **permit**	Denies or permits access if specified conditions are met.

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protocol	Specifies an IP protocol for which to deny or permit access. Valid values and their corresponding protocols are: • **ip** - Any Internet protocol • **icmp** - Internet Control Message Protocol • **udp** - User Datagram Protocol • **tcp** - Transmission Protocol
source	Specifies the network or host from which the packet will be sent. Valid options for expressing source are: • IP address or range of addresses (A.B.C.D) • **any** - Any source host • **host** *source* - IP address of a single source host
source-wildcard	(Optional) Specifies the bits to ignore in the *source* address.
destination	Specifies the network or host to which the packet will be sent. Valid options for expressing destination are: • IP address (A.B.C.D) • **any** - Any destination host • **host** *source* - IP address of a single destination host
destination-wildcard	(Optional) Specifies the bits to ignore in the *destination* address.
icmp-type	(Optional) Filters ICMP frames by ICMP message type. The type is a number from **0** to **255**.
icmp-code	(Optional) Further filters ICMP frames filtered by ICMP message type by their ICMP message code. The code is a number from **0** to **255**.

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operator port	(Optional) Applies access rules to TCP or UDP source or destination port numbers. Possible operands include: • **lt** *port* - Match only packets with a lower port number. • **gt** *port* - Match only packets with a greater port number. • **eq** *port* - Match only packets on a given port number. • **neq** *port* - Match only packets not on a given port number. • **range** *min-sport max-sport* - Match only packets in the range of source ports • **range** *min-dport max-dport* - Match only packets in the range of destination ports.
established	(Optional) Applies TCP restrictions to established connections only.

Command Syntax of the "no" Form

The "no" form of this command removes the defined access list or entry:

no access-list *access-list-number* [*entry*]

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

- If **insert**, **replace**, or **move** are not specified, the new entry will be appended to the access list.
- If *source2* is not specified with **move**, only one entry will be moved.
- If *icmp-type* and *icmp-code* are not specified, ICMP parameters will be applied to all ICMP message types.
- If *operator* and *port* are not specified, access parameters will be applied to all TCP or UDP ports.
- If **established** is not specified, TCP restriction will be applied to all connections.

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Examples

This example shows how to define access list 101 to deny ICMP transmissions from any source and for any destination:

```
Matrix>Router(config)#access-list 101 deny ICMP any any
```

This example shows how to define access list 102 to deny TCP packets transmitted from IP source 10.1.2.1 with a port number of 42 to any destination:

```
Matrix>Router(config)#access-list 102 deny TCP host 10.1.2.1 eq 42 any
```

14.3.7.4 ip access-group

Use this command to apply access restrictions on an interface when operating in router mode.

ip access-group *access-list-number* {**in** | **out**}

ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

Syntax Description

access-list-number	Specifies the number of the access list to be applied to the access list. This is a decimal number from **1** to **199**.
in	Filters inbound packets.
out	Filters outbound packets.

Command Syntax of the "no" Form

The "no" form of this command removes the specified access list:

no ip access-group *access-list-number* {**in** | **out**}

Command Type

Router command.

Command Mode

Interface configuration: **Matrix>Router(config-if(Vlan <vlan_id>))#**

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Command Defaults

None.

Example

This example shows how to apply access list 1 for all inbound packets on VLAN 1. Through the definition of access list 1, only packets with destination 192.5.34.0 will be routed. All the packets with other destination received on VLAN 1 are dropped:

```
Matrix>Router(config)#access-list 1 permit 192.5.34.0 0.0.0.255
Matrix>Router(config)#interface vlan 1
Matrix>Router(config-if(Vlan 1))#ip access-group 1 in
```

14.3.8 Configuring Denial of Service Prevention

Purpose

To configure Denial of Service (DoS) prevention, which will protect the router from attacks and notify administrators via Syslog.

Commands

The commands needed to configure DoS prevention are listed below and described in the associated section as shown:

- show HostDos (Section 14.3.8.1)
- HostDos (Section 14.3.8.2)
- clear hostdos-counters (Section 14.3.8.3)

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14.3.8.1 show HostDos

Use this command to display Denial of Service security status and counters.

show HostDos

ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

NOTE: When fragmented ICMP packets protection is enabled, the Ping of Death counter will not be incremented. Ping of Death is a subset of the fragmented ICMP function.

Syntax Description

None,

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

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Example

This example shows how to display Denial of Service security status and counters. For details on how to set these parameters, refer to Section 14.3.8.2:

```
Matrix>Router(config)#show HostDos
LANDd Attack (Destination IP = Source IP)
   Disabled
Spoofed Address Check
   Disabled
IP packet with multicast/broadcast source address
   Always enabled
   0 attacks
Fragmented ICMP traffic
   Disabled
Large ICMP packet
   Disabled
Ping-of-Death attack
   Always enabled
   0 attacks
Port Scanning
   Disabled
```

14.3.8.2 HostDos

Use this command to enable or disable Denial of Service security features.

HostDos {**land** | **fragmicmp** | **largeicmp** *size* | **checkspoof** | **portscan**}

ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

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Syntax Description

land	Enables land attack protection and automatically discards illegal frames.
fragmicmp	Enables fragmented ICMP and Ping of Death packets protection and automatically discards illegal frames.
largeicmp *size*	Enables large ICMP packets protection, specifies the packet size above which the protection starts, and automatically discards illegal frames. Valid packet size values are 1 to 65535. The default is 1024.
checkspoof	Enables spoofed address checking and automatically reports spoofed addresses via Syslog.
portscan	Enables port scan protection and automatically reports via Syslog that port scanning is in progress.

Command Syntax of the "no" Form

The "no" form of this command disables the specified security features:

no HostDos {**land** | **fragmicmp** | **largeicmp** *size* | **checkspoof**}

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to enable land attack and large ICMP packets protection for packets larger than 2000 bytes:

```
Matrix>Router(config)#HostDos land
Matrix>Router(config)#HostDos largeicmp 2000
```


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14.3.8.3 clear hostdos-counters

Use this command to clear Denial of Service security counters.

clear hostdos-counters

ROUTER: This command can be executed when the device is in **router mode** only. For details on how to enable router configuration modes, refer to Section 3.3.3.

Syntax Description

None.

Command Type

Router command.

Command Mode

Global configuration: **Matrix>Router(config)#**

Command Defaults

None.

Example

This example shows how to clear Denial of Service security counters:

```
Matrix>Router(config)#clear hostdos-counters
```


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14.3.9 Configuring Flow Setup Throttling (FST)

About FST

Flow Setup Throttling (FST) is a proactive feature designed to mitigate DoS attacks before the virus can wreak havoc on the network. FST directly combats the effects of DoS attacks by limiting the number of new or established flows that can be programmed on any individual switch port. This is achieved by monitoring the new flow arrival rate and/or controlling the maximum number of allowable flows.

FST limits the vulnerability of connection attacks on the network by allowing administrators to:

- Globally enable FST on the switch and on a port-by-port basis.
- Configure the maximum flows allowed per user classification (port type) and the actions that will occur when flow limits are reached.
- Assign a user classification to each interface.
- Control the generation of SNMP notifications.
- Control the time (in seconds) to wait before generating another notification of the same type on the same interface.
- Control link status.

Purpose

To review and configure Flow Setup Throttling.

Commands

The commands needed to configure Flow Setup Throttling are listed below and described in the associated section as shown:

- show flowlimit (Section 14.3.9.1)
- set flowlimit (Section 14.3.9.2)
- set flowlimit limit (Section 14.3.9.3)
- set flowlimit class (Section 14.3.9.4)
- clear flowlimit action (Section 14.3.9.5)
- set flowlimit shutdown (Section 14.3.9.6)

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- set flowlimit notification (Section 14.3.9.7)
- set flowlimit clearstats (Section 14.3.9.8)

14.3.9.1 show flowlimit

Use this command to display flow setup throttling information.

show flowlimit [**limit**] [[**port**] [*port-string*]] [[**stats**] [*port-string*]]

Syntax Description

limit	(Optional) Displays flow limits and actions.
port *port-string*	(Optional) Displays flow limiting port settings for one or all ports.
stats *port-string*	(Optional) Displays flow limiting statistics for one or all ports.

Command Type

Switch command.

Command Mode

Read-Only.

Command Defaults

If no optional parameters are specified, detailed flow limiting information will be displayed for all ports.

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Example

This example shows how to display all flow limiting limits and actions:

```
Matrix>show flowlimit limit
  Flow limit status                    - enabled
  Flow limit notifications             - disabled
  Flow limit shutdown                  - disabled
  Flow limit notification interval     - 120
  Flow limit maximum flowcount         - 128000

  Flow limit table
  ----------------
               Limit      Action
               ----       -----
  User port
    limit 1    1
    limit 2    0
  Server port
    limit 1    0
    limit 2    0
  Aggregation port
    limit 1    0
    limit 2    0
  Interswitch link
    limit 1    0
    limit 2    0
  Unspecified
    limit 1    0
    limit 2    0
```

Table 14-8 provides an explanation of the command output.

Table 14-8 show flowlimit Output Details

Output	What It Displays...
Flow limit status	Whether FST is enabled or disabled. Default state of disabled can be changed with the **set flowlimit** command (Section 14.3.9.2).
Flow limit notification	Whether flow limit notification (SNMP trap) is enabled or disabled. Default state of disabled can be changed with the **set flowlimit notification** command (Section 14.3.9.7).

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Table 14-8 show flowlimit Output Details (Continued)

Output	What It Displays...
Flow limit shutdown	Whether flow limit shut down is enabled or disabled. Default state of disabled can be changed with the **set flowlimit shutdown** command (Section 14.3.9.6).
Flow limit notification interval	Interval in seconds at which an SNMP notification will be sent when a specified flow limit is reached. This function can be enabled, and the default interval of 120 can be changed, with the **set flowlimit notification** command (Section 14.3.9.7).
Flow limit maximum flowcount	Number of flows that, if exceeded, will trigger a configured action. Set using the **set flowlimit limit** command (Section 14.3.9.3).
Flow limit table	Lists flow limits and assigned actions for FST port classifications.

14.3.9.2 set flowlimit

Use this command to enable or disable flow setup throttling globally or on one or more port(s), or to re-enable one or more port(s) that were disabled due to flow setup throttling.

set flowlimit {[**system** | *port-string* **disable** | **enable**] [*port-string* **operational**]}

Syntax Description

system | *port-string* **disable** | **enable**	Enables or disables FST globally or one specific port(s).
port-string **operational**	Re-enables one or more ports disabled by the flow limit shut down function (as described in Section 14.3.9.6).

Command Type

Switch command.

Command Mode

Read-Write.

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Command Defaults

None.

Example

This example shows how to enable FST on Fast Ethernet front panel ports 1-5:

```
Matrix>set flowlimit fe.0.1-5 enable
```

14.3.9.3 set flowlimit limit

Use this command to set a flow limit and an action for a port user classification. Once configured, this action can be assigned to one or more ports using the **set flowlimit class** command as described in Section 14.3.9.4.

set flowlimit limit {**1** | **2**} {**aggregationport** | **interswitchlink** | **serverport** | **unspecified** | **userport**} *limit* [**discard** | **drop** | **trap** | **disable**]}

Syntax Description

1 | **2**	Specifies this configuration as action 1 or 2. Two actions describing what will occur when a certain flow limit is reached can be defined per user classification.
aggregationport | **interswitchlink** | **serverport** | **unspecified** | **userport**	Assigns this action configuration to the user classification port type: • aggregation port • inter-switch link • server port • user port • unspecified port
limit	Specifies the number of flows that will trigger this action configuration. Valid values are **0** - **128000**.

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discard | **drop** | **trap** | **disable**	Specifies the action to be taken if flow limit is reached as: • Discarding excess flows. This causes a "discard flow" to be created. Packets are accepted to this flow but are discarded (not forwarded anywhere). This allows the flow counters to be updated (and possibly reach a second higher threshold action (for example: trap or disable, as described below). • Dropping excess flows. The E1 does not support this option. If set, the E1 will behave the same as setting the attribute to "discard" and discard flows will be created. • Generating an SNMP trap notification (if the **set flowlimit notification** function is enabled as described in Section 14.3.9.7). • Disabling the interface (if the **set flowlimit shutdown** function is enabled as described in Section 14.3.9.6). This will clear all FST settings on the port.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to set flow limiting action 1 to discard all flows exceeding 12 on ports classified as user ports:

```
Matrix>set flowlimit limit 1 userport 12 discard
```


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14.3.9.4 set flowlimit class

Use this command to assign a flow limiting user classification to one or more port(s). Once a classification is assigned, these ports will be subject to the flow limit and action configured with the **set flowlimit limit** command as described in Section 14.3.9.3.

set flowlimit *port-string* **class** {**aggregationport** | **interswitchlink** | **serverport** | **unspecified** | **userport**}

Syntax Description

port-string	Specifies port(s) on which to assign user classification.
aggregationport | **interswitchlink** | **serverport** | **unspecified** | **userport**	Assigns a user classification type to the port(s) as: • aggregation port • interswitch link • server port • user port • unspecified port

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to assign the user port classification type to Fast Ethernet front panel ports 3-5:

```
Matrix>set flowlimit fe.0.3-5 class userport
```


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14.3.9.5 clear flowlimit action

Use this command to remove an existing flow limit action.

clear flowlimit action {**1** | **2**}{**aggregationport** | **interswitchlink** | **serverport** | **unspecified** | **userport**} {**discard** | **drop** | **trap** | **disable**}}

Syntax Description

1 | **2**	Specifies that action 1 or 2 will be removed.
aggregationport | **interswitchlink** | **serverport** | **unspecified** | **userport**	Removes this action configuration from the specified user classification port type. For a description of these parameters, refer back to Section 14.3.9.3.
limit	Specifies the number of flows that will trigger this action configuration. Valid values are **0 - 128000**.
discard | **drop** | **trap** | **disable**	Specifies the action to be removed. For a description of these parameters, refer back to Section 14.3.9.3

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to remove flow limiting action 1, which is to discard all flows exceeding 12 on ports classified as user ports:

```
Matrix>clear flowlimit action 1 userport 12 discard
```


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14.3.9.6 set flowlimit shutdown

Use this command to enable or disable the flow limit shut down function. When enabled, this allows ports configured with a “disable” action to shut down. For information on using the **set flowlimit limit** command to configure set a disable action on a port, refer to Section 14.3.9.3.

set flowlimit shutdown {**enable** | **disable**}

Syntax Description

enable | **disable**	Enables or disables the flow limit shut down function.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable the flow limit shut down function:

```
Matrix>set flowlimit shutdown enable
```


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14.3.9.7 set flowlimit notification

Use this command to enable or disable flow limit notification, or to set a notification interval. When enabled, this allows ports configured with a "trap" action to send an SNMP trap message when a specified flow limit is reached. For information on using the **set flowlimit limit** command to configure a trap action on a port, refer to Section 14.3.9.3.

set flowlimit notification {**enable** | **disable** | **interval** *interval*}

Syntax Description

enable | **disable**	Enables or disables SNMP notification.
interval *interval*	Specifies a notification interval (in seconds) for SNMP trap messages. Valid values are **0 - 4294967295**.

Command Type

Switch command.

Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to enable the flow limit notification function:

```
Matrix>set flowlimit notification enable
```

14.3.9.8 set flowlimit clearstats

Use this command to reset flow limiting statistics back to default values on one or more port(s).

set flowlimit *port-string* **clearstats**

Syntax Description

port-string	Specifies port(s) on which flow limiting statistics will be cleared.

Command Type

Switch command.

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Command Mode

Read-Write.

Command Defaults

None.

Example

This example shows how to reset flow limiting statistics back to default values on Fast Ethernet front panel port 5:

```
Matrix>set flowlimit fe.0.5 clearstats
```


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14.4 WORKING WITH SECURITY CONFIGURATIONS

14.4.1 Host Access Control Authentication (HACA)

To use HACA, the embedded RADIUS client on the Matrix E1 device must be configured to communicate with the RADIUS server. A RADIUS server must be online and its IP address(es) must be configured with the same password as the RADIUS client. When using the **set radius** command (Section 14.3.1.2) to configure the RADIUS server IP address on the Matrix E1, the switch will prompt for this Read-Write (rw) “server secret” password, which is used to encrypt RADIUS frames.

By default at device startup, the RADIUS client is disabled. Default values are as follows:

- Timeout: 20 seconds
- Retries: 3
- Primary and secondary authentication ports: 0
- Last-resort-action for local and remote authentication is to challenge the user for a system password.

The Matrix E1 Series device allows for up to 10 RADIUS servers to be configured, with up to 2 active at any given time. If only one RADIUS server is configured, the device assumes it is the primary server. It is not necessary to reboot after the client is reconfigured.

When the RADIUS client is active on the Matrix E1 device, the user is prompted for a user login name and password when attempting to access the host IP address via CLI. The embedded RADIUS client encrypts the information entered by the user and sends it to the RADIUS server for validation. Then the server returns an access-accept or access-reject response back to the client, allowing or denying the user to access the host application with the proper access level.

When the RADIUS client cannot communicate with the RADIUS server for the time of (retries * timeout = 3 * 20 = 60 secs), the authentication process will timeout, notify the user that the RADIUS server has timed out by printing the message to the screen, and the RADIUS last-resort-action setting will kick in. If the user is trying to login via the local console and the local last-resort-action is set to accept, then the user will be granted access to the switch. On the other hand, if the local last-resort-action is set to reject, then the user will be rejected the access to the switch. However, if the local last-resort-action is set to challenge, the user will be prompted to enter the local username and password. If the local username and password matches the local database, then access to the switch is allowed.

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14.4.2 802.1X Port Based Network Access Control Overview

When using the physical access characteristics of IEEE 802 LAN infrastructures, the 802.1X standard provides a mechanism for administrators to securely authenticate and grant appropriate access to end user devices directly attached to Matrix E1 device ports. When configured in conjunction with NetSight Policy Manager and RADIUS server(s), Enterasys Networks' Matrix E1 devices can dynamically administer user based policy that is specifically tailored to the end user's needs.

The device supports 802.1X security and authentication features to:

- Authenticate hosts that are connected to dedicated switch ports.
- Authenticate based on single-user hosts. (If a host is a time-shared Unix or VMS system, successful authentication by any user will allow all users access to the network.)
- Allow users to authenticate themselves by logging in with user names and passwords, token cards, or other high-level identification. Thus, a system manager does not need to spend hours setting low-level MAC address filters on every edge switch to simulate user-level access controls.
- Divide system functionality between supplicants (user machines), authenticators, and authentication servers. Authenticators reside in edge switches. They shuffle messages and tell the switch when to grant or deny access, but do not validate logins. User validation is the job of authentication servers. This separation of functions allows network managers to put authentication servers on central servers.
- Use EAPOL to communicate between the authenticator (switch) and the authentication server. For more information on configuring EAPOL on the device, refer to Section 14.3.2.

14.4.3 MAC Authentication Overview

MAC authentication allows secure network access by validating the MAC addresses of authorized user devices connected to MAC authentication-enabled ports. Network management statically provisions MAC addresses in a central RADIUS server, which allows those pre-configured MAC addresses network access the usual RADIUS validation process. This section describes how MAC authentication and 802.1X cooperate to provide an integrated approach to authentication.

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14.4.3.1 Authentication Method Sequence

When MAC authentication is enabled on a port, the authentication of a specific MAC address commences immediately following the reception of any frame. The MAC address and a currently stored password for the port are used to perform a Password Authentication Protocol (PAP) authentication with one of the configured RADIUS servers. If successful, the port forwarding behavior is changed according to the authorized access policy and a session is started. If unsuccessful, the forwarding behavior of the port remains unchanged.

If successful, the filter-id in the RADIUS response may contain a policy string of the form policy=”policy name”. If the string exists and it refers to a currently configured access policy in this switch, then the port receives this new policy. If authenticated, but the authorized policy is invalid or non-existent, then the port forwards the frame normally according to the port default policy, if one exists. Otherwise, frames are forwarded without any policy.

14.4.3.2 Concurrent Operation of 802.1X and MAC Authentication

NOTE: Port Web Authentication (PWA) cannot be enabled if either MAC authentication or EAPOL (802.1X) is enabled. For information on configuring PWA as an alternative authentication method, refer to Section 14.3.5.

When both 802.1X (EAPOL) and MAC authentication are enabled on the same device, the switch enforces a precedence relationship between MAC authentication and 802.1X methods. This section defines the precedence rules to determine which authentication method has control over an interface.

When both methods are enabled, and when a user is authenticated using the 802.1X method, 802.1X takes precedence over MAC authentication. If the port or MAC remains unauthenticated in 802.1X, then MAC authentication is active and may authenticate the next MAC address received on that port.

MAC authentication and 802.1X can be configured to run concurrently on the same module, but exclusively on distinct interfaces. To achieve this, the 802.1X port behavior in the force-unauthorized state is overloaded by enabling both 802.1X and MAC authentication, setting the 802.1X MIB to force-unauthorized for the interface in question, and enabling it for MAC authentication. This allows MAC authentication to run unhindered by 802.1X on that interface by, in effect, disabling all 802.1X control over it.

If a switch port is configured to enable both 802.1X and MAC authentication, then it is possible for the switch to receive a start or a response 802.1X frame while a MAC authentication is in progress.

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If this situation, the switch immediately aborts MAC authentication. The 802.1X authentication then proceeds to completion. After the 802.1X login completes, the user has either succeeded and gained entry to the network, or failed and is denied access to the network. After the 802.1X login attempt, no new MAC authentication logins occur on this port until:

- A link is toggled.
- The user executes an 802.1X logout.
- Management terminates the 802.1X session.

NOTE: The switch may terminate a session in many different ways. All of these reactivate the MAC authentication method. Refer to Table 14-9 for the precedence relationship between MAC and 802.1X authentication.

When a port is set for concurrent use of MAC and 802.1X authentication, the switch continues to issue EAPOL request/ID frames until a MAC authentication succeeds or the switch receives an EAPOL response/ID frame.

Table 14-9 further defines the precedence rules the Matrix E1 uses to determine which authentication method has control over an interface.

Table 14-9 MAC / 802.1X Precedence States

802.1X Port Control (EAPOL)	MAC Port Control	MAC Authen-ticated?	Default Port Policy Exists?	PAP Autho-rized Policy Exists?	Action
Force Authorized	Don't Care	Don't Care	Yes	Don't Care	• Neither method performs authentication. • Frames are forwarded according to default policy.
Force Authorized	Don't Care	Don't Care	No	Don't Care	• Neither method performs authentication. • Frames are forwarded.
Auto	Enabled	Yes	Don't Care	Yes	• Hybrid authentication (both methods are active). • Frames are forwarded according to authorized policy.

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Table 14-9 MAC / 802.1X Precedence States (Continued)

802.1X Port Control (EAPOL)	MAC Port Control	MAC Authen-ticated?	Default Port Policy Exists?	PAP Autho-rized Policy Exists?	Action
Auto	Enabled	Yes	Yes	No	• Hybrid authentication (both methods are active). • Frames are forwarded according to default policy.
Auto	Enabled	Yes	No	No	• Hybrid authentication (both methods active). • Frames are forwarded.
Auto	Enabled	No	Yes	Don't Care	• Hybrid authentication (both methods are active). • Frames are forwarded according to default policy.
Auto	Enabled	No	No	Don't Care	• Hybrid authentication (both methods are active). • Frames are discarded.
Auto	Disabled	Yes	Don't Care	Yes	• 802.1X performs authentication. • Frames are forwarded according to authorized policy.
Auto	Disabled	Yes	Yes	No	• 802.1X performs authentication. • Frames are forwarded according to default policy.
Auto	Disabled	Yes	No	No	• 802.1X performs authentication. • Frames are forwarded.
Auto	Disabled	No	Yes	Don't Care	• 802.1X performs authentication. • Frames are forwarded according to default policy.
Auto	Disabled	No	No	Don't Care	• 802.1X performs authentication. • Frames are discarded.

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Table 14-9 MAC / 802.1X Precedence States (Continued)

802.1X Port Control (EAPOL)	MAC Port Control	MAC Authen-ticated?	Default Port Policy Exists?	PAP Autho-rized Policy Exists?	Action
Force Unauthori-zation	Enabled	Yes	Don't Care	Yes	• MAC performs authentication. • Frames are forwarded according to authorized policy.
Force Unauthori-zation	Enabled	Yes	Yes	No	• MAC performs authentication. • Frames are forwarded according to default policy.
Force Unauthori-zation	Enabled	Yes	No	No	• MAC performs authentication. • Frames are forwarded.
Force Unauthori-zation	Enabled	No	Yes	Don't Care	• MAC performs authentication. • Frames are forwarded according to default policy.
Force Unauthori-zation	Enabled	No	No	Don't Care	• MAC performs authentication. • Frames are discarded.
Force Unauthori-zation	Disabled	Don't Care	Don't Care	Don't Care	• Neither method performs authentication. • Frames are discarded.

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14.4.4 MAC Authentication Control

This global variable can be enabled or disabled using the **set macauthentication** command as described in Section 14.3.3.3.

If enabled, then

- MAC authentication is active on those ports individually enabled using the **set macauthentication port** command as described in Section 14.3.3.5.
- All session and statistic information is reset to defaults.
- Any MAC addresses currently locked to ports are unlocked.

If disabled, then

- MAC authentication stops for all ports.
- All active sessions are terminated.
- All ports currently authenticated using 802.1X, are unaffected.
- Any 802.1X ports, which were set to forced-unauth, revert back to discarding all frames regardless of the MAC authentication state.

14.4.5 RADIUS Filter-ID Attribute and Dynamic Policy Profile Assignment

If you configure an authentication method that requires communication with a RADIUS server, you can use the RADIUS Filter-ID attribute to dynamically assign a policy profile and/or management level to authenticating users and/or devices.

The RADIUS Filter-ID attribute is simply a string that is formatted in the RADIUS Access-Accept packet sent back from the RADIUS server to the switch during the authentication process.

Each user can be configured in the RADIUS server database with a RADIUS Filter-ID attribute that specifies the name of the policy profile and/or management level the user should be assigned upon successful authentication. During the authentication process, when the RADIUS server returns a RADIUS Access-Accept message that includes a Filter-ID matching a policy profile name configured on the switch, the switch then dynamically applies the policy profile to the physical port the user/device is authenticating on.

Filter-ID Attribute Formats

Enterasys Networks supports two Filter-ID formats — “decorated” and “undecorated.” The decorated format has three forms:

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- To specify the policy profile to assign to the authenticating user (network access authentication):

  `Enterasys:version=1:policy=`*`string`*

  where *string* specifies the policy profile name. Policy profile names are case-sensitive.

- To specify a management level (management access authentication):

  `Enterasys:version=1:mgmt=`*`level`*

  where *level* indicates the management level, either **ro**, **rw**, or **su**.

- To specify both management level and policy profile:

  `Enterasys:version=1:mgmt=`*`level`*`:policy=`*`string`*

The undecorated format is simply a string that specifies a policy profile name. The undecorated format cannot be used for management access authentication.

Decorated Filter-IDs are processed first by the switch. If no decorated Filter-IDs are found, then undecorated Filter-IDs are processed. If multiple Filter-IDs are found that contain conflicting values, a Syslog message is generated.

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